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CANADIAN SEED GROWERS' ASSOCIATION

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# REPORT

OF

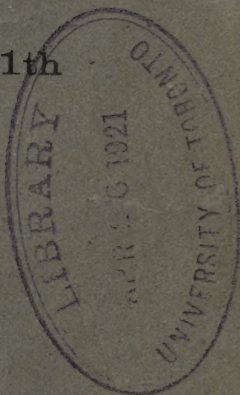
# SIXTH ANNUAL MEETING

HELD AT

Ottawa, February 10th and 11th

1910

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PART I.—MINUTES

PART II.—PAPERS AND ADDRESSES PRESENTED

OTTAWA  
GOVERNMENT PRINTING BUREAU  
1910







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# CANADIAN SEED GROWERS' ASSOCIATION

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HEAD OFFICE: CANADIAN BUILDING, OTTAWA, ONT.

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## OFFICERS, 1910-11.

*President.*—Jas. W. Robertson, C.M.G., Ottawa, Ont.

*Vice-Presidents.*—Prof. C. A. Zavitz, Guelph, Ont.; Messrs. G. A. Gigault, Deputy Minister of Agriculture, Quebec; John Mooney, Regina, Sask.

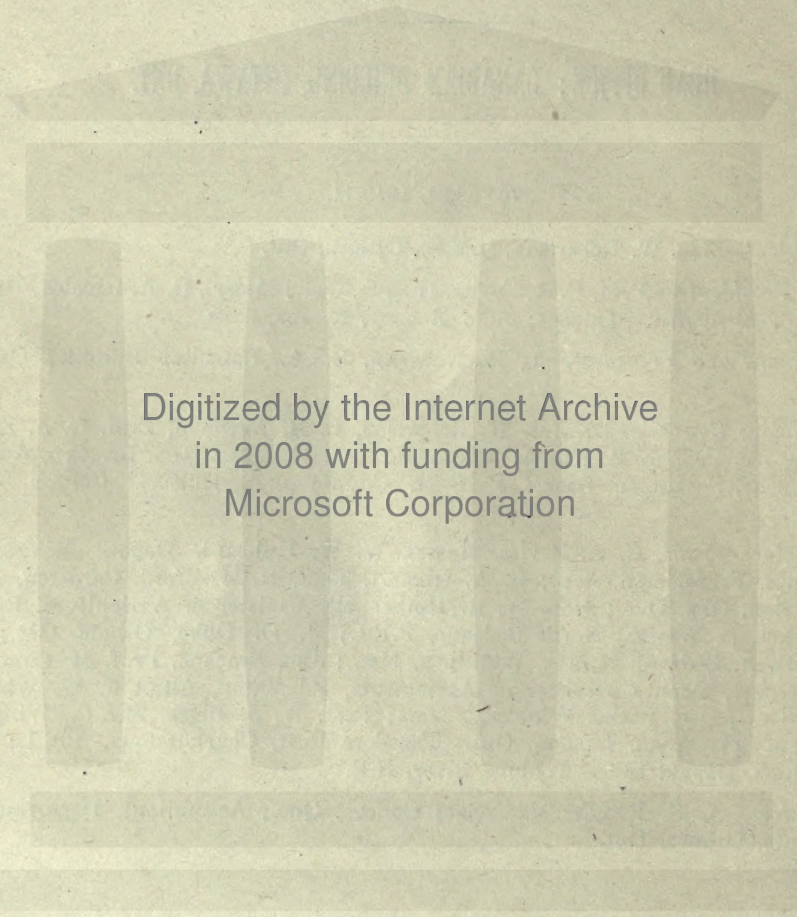
*Secretary and Treasurer.*—L. H. Newman, B.S.A., Canadian Building, Ottawa, Ont.

*Executive Council.*—Dr. Jas. W. Robertson, L. H. Newman, Prof. C. A. Zavitz, G. A. Gigault, Prof. L. S. Klinck, Macdonald College, Que.; Jno. Bracken, Agricultural College, Saskatoon, Sask.; Prof. M. Cumming, Agricultural College, Truro, N.S.

*Directors.*—Prof. C. A. Zavitz, Messrs. W. W. Hubbard, Deputy Minister of Agriculture, Fredericton, N.B.; G. A. Gigault, Thos. H. Woolford, Cardston, Alta.; J. Demitriou, Oka, Que.; Hon. W. R. Motherwell, Minister of Agriculture, Regina, Sask.; Thos. S. Waugh, North Bedeque, P.E.I.; J. O. Duke, Olinda, Ont.; Jno. Mooney, S. A. Bedford, M.A.C., Winnipeg, Man.; Jno. Bracken, Prof. M. Cumming, Geo. Harcourt, Deputy Minister of Agriculture, Edmonton, Alta.; J. W. Wheaton, Toronto, Ont.; Geo. Batho, Winnipeg, Man.; Prof. W. J. Black, M.A.C., Winnipeg, Man.; Wm. Thompson, London, Ont.; Theodore Ross, Charlottetown, P.E.I.; Prof. L. S. Klinck, Donald Innes, Tobique River, N.B.

*Auditors.*—L. S. Klinck, Macdonald College, Que.; Accountant, Department of Agriculture, Ottawa, Ont.





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# CANADIAN SEED GROWERS' ASSOCIATION

## LIST OF OPERATING MEMBERS, 1909-10.

The following list gives the names and addresses of the members from whom satisfactory reports were received for 1909, together with the kinds and varieties of crops with which they are operating, and the number of consecutive years which the seed has been selected:—

### WHEAT.

#### *Alberta.*

- Hecko, Peter, Clover Bar, Sec. 20, Tp. 53, R. 23, W. 4th Mer.; Red Fife, 2 years.  
McDonnell, A. W., Loughheed, Sec. 26, Tp. 43, R. 11, W. 4th Mer.; Red Fife, 4 years.  
Pawson Bros., Coaldale, Sec. 1, Tp. 9, R. 20, W. 4th Mer.; Red Fife, 6 years.  
Perry, A., Cardston, Sec. 30, Tp. 2, R. 25, W. 4th Mer.; Red Cross, 1 year.  
Woolford, Thos. H., Cardston, Sec. 9, Tp. 3, R. 25, W. 4th Mer.; Turkey Red, 2 years.

#### *Saskatchewan.*

- Barnet, Wm., Elfros, Sec. 2, Tp. 33, R. 14, W. 2nd Mer. Marquis, 1 year.  
Black, W. M., Creelman, Sec. 9, Tp. 10, R. 10, W. 2nd Mer.; Red Fife, 6 years.  
Brown, Jas., Arcola, Sec. 25, Tp. 7, R. 5, W. 2nd Mer.; Red Fife, 1 year.  
Coles, F., Moffat, Sec. 36, Tp. 15, R. 10, W. 2nd Mer.; Preston, 6 years.  
Coles, F., Moffat, Sec. 36, Tp. 15, R. 10, W. 2nd Mer.; Marquis.  
Carter, R. H., Fort Qu'Appelle, Sec. 17, Tp. 21, R. 14, W. 2nd Mer.; Red Fife, 1 year.  
Dash, F. J., Hillesden, Sec. 22, Tp. 15, R. 6, W. 2nd Mer.; Red Fife, 9 years.  
Dunbabin, T. W., Craik, Sec. 32, Tp. 24, R. 28, W. 2nd Mer.; Red Fife, 2 years.  
Hampton, S. W., Graytown, Sec. 30, Tp. 12, R. 7, W. 2nd Mer.; Red Fife, 4 years.  
Ind, Frederick, Lloydminster, Sec. 22, Tp. 50, R. 27, W. 3rd Mer.; Red Fife, 1 year.  
Hopkins, Percy, Anerley, Sec. 28, Tp. 27, R. 10, W. 3rd Mer.; Red Fife, 4 years.  
Mooney, Jno., Regina, Sec. 19, Tp. 17, R. 19, W. 2nd Mer.; Red Fife, 7 years.  
Mooney, Jno., Regina, Sec. 19, Tp. 17, R. 19, W. 2nd Mer.; Marquis.  
Parsons, R., Glenavon, Sec. 26, Tp. 14, R. 9, W. 2nd Mer.; Red Preston, 1 year.  
Rowley-Noyes, R. J., Marshall, Sec. 4, Tp. 48, R. 27, W. 3rd Mer.; Red Fife, 3 years.  
Saunders, W. J., Marshall, Sec. 22, Tp. 48, R. 26, W. 3rd Mer.; Stanley, 2 years.  
Smith, Geo. L., Saskatoon, Sec. 28, Tp. 36, R. 6, W. 3rd Mer.; Red Fife, 2 years. (early str.)  
Spencer, F. N., Craik, Sec. 1, Tp. 24, R. 28, W. 2nd Mer.; Red Fife, 4 years.  
Telfer, Jno., South Melfort, Sec. 22, Tp. 44, R. 18, W. 2nd Mer.; Red Fife, 2 years.  
Thompson, W. W., Riga, Sec. 32, Tp. 12, R. 33, W. 1st Mer.; Red Fife, 4 years.  
Wheeler, S., Rosthern, Sec. 3, Tp. 43, R. 3, W. 3rd Mer.; Preston, 2 years.



*Manitoba.*

Bedford, E., Mrs., Morden, Sec. 6, Tp. 2, R. 5, W. Prin. Mer., Red Fife, 1 year.  
 Bradshaw, G. H., Morden, Sec. 3, Tp. 25, R. 6, W. Prin. Mer., Red Fife, 3 years.  
 Cooper, A., Treesbank, Sec. 2, Tp. 8, R. 16, W. Prin. Mer.; Red Fife, 3 years.  
 Dow Bros., Gilbert Plains, Sec. 9, Tp. 25, R. 22, W. Prin. Mer.; Red Fife, 7 years.  
 Henry, J. L., Beaver, Sec. 36, Tp. 12, R. 10, W. Prin. Mer.; Red Fife, 3 years.  
 Lumb Bros., Cartwright, Sec. 19, Tp. 3, R. 14, W. Prin. Mer.; Red Fife, 7 years.  
 Lumb, Geo., Cartwright, Sec. 7, Tp. 3, R. 14, W. Prin. Mer.; Red Fife, 7 years.  
 Paterson, David, Berton, Sec. 4, Tp. 14, R. 12, W. Prin. Mer.; Red Fife, 3 years.  
 Rowe, W. A. A., Neepawa, Sec. 25, Tp. 15, R. 16, W. Prin. Mer.; Red Fife, 3 years.  
 Smith, J. C., Darlingford, Sec. 17, Tp. 2, R. 7, W. Prin. Mer.; Red Fife, 2 years.  
 Stewart, Jas. R., Gladstone, Sec. 18, Tp. 14, R. 12, W. 1st Mer.; Red Fife, 2 years.  
 Thomson, Thos., Roden, Sec. 22, Tp. 11, R. 22, W. Prin. Mer.; Red Fife, 10 years.  
 Webb, H. K., Swan River, Sec. 34, Tp. 36, R. 27, W. Prin. Mer.; Stanley, 3 years.  
 Wiener, John, Miami, Sec. 3, Tp. 5, R. 7, W. Prin. Mer.; Red Fife, 1 year.  
 Wight, Gus, Napinka, Sec. 20, Tp. 4, R. 25, W. Prin. Mer.; Red Fife, 3 years.

*Ontario.*

Carmichael, Duncan, West Lorne, Elgin County; Dawson's Golden Chaff, 1 year.  
 Davidson, H., Mount Nemo, Halton County; Early Red Clawson.  
 Fletcher, J. A., Valetta, Kent County; Mediterranean.  
 Gies, C. R., Heidelberg, Waterloo County; Dawson's Golden Chaff, 10 years.  
 Hartman, Walter, Clarksburg, Grey County; Red Fife, 1 year.  
 McCallum, Jno., Shakespeare, Perth County; Abundance, 4 years.  
 McKay, Robert, Maxville, Glengarry County; Red Fife, 9 years.

*Quebec.*

Levasseur, Jérémie, Tessierville, Rimouski County; Campbell's W. Chaff, 10 years.  
 Perron, Jos., Les Eboulements, Charlevoix County; Perron, 10 years.  
 Taylor, W. H., St. Giles, Lotbinière County; Red Fife.

*New Brunswick.*

Innes, Donald, Tobique River, Victoria County; White Fife, 10 years.  
 Moore, Wm. H., Scotch Lake, York County; Red Fife, 2 years.  
 Palmer, W. E., Scotch Lake, York County; White Russian, 1 year.

*Nova Scotia.*

Eadie, Harry, Antigonish, Antigonish County; Red Fife, 4 years.  
 Mackay, Robert D., Balmoral Mills, Colchester County; Red Fife, 3 years.  
 McKay, Robert, Millville, Pictou County; Red Fife, 10 years.

*Prince Edward Island.*

Arsenault, L. A., Urbinville, Prince County; White Russian, 1 year.  
 Arsenault, Elie E., Urbinville, Prince County; White Russian, 4 years.  
 Creed, Richard, Albion, King's County; White Russian, 3 years.  
 Marchbank, Percy, New Annan, Prince County; White Fife, 3 years.



McMillan, Gordon, Cornwall, Queens County; White Fife, 10 years.  
 Waugh, Thos., North Bedeque, Prince County; White Russian, 10 years.  
 Wiggington, T. J., Bridgton, Kings County; White Russian, 10 years.

## OATS.

*Alberta.*

McDonnell, A. W., Lougheed, Sec. 26, Tp. 43, R. 11, W. 4th Mer.; Banner, 6 years.  
 Pawson Bros., Coaldale, Sec. 1, Tp. 9, R. 20, W. 4th Mer.; Banner, 2 years.  
 Stauffer, O. W., Didsbury, Sec. 18, Tp. 31, R. 1, W. 5th Mer.; Tartar King, 1 year.

*Saskatchewan.*

Black, W. M., Creelman, Sec. 9, Tp. 10, R. 10, W. 2nd Mer.; Banner, 2 years.  
 Coles, F., Moffat, Sec. 36, Tp. 15, R. 10, W. 2nd Mer.; Abundance, 1 year.  
 Carter, R. H., Fort Qu'Appelle, Sec. 17, Tp. 21, R. 14, W. 2nd Mer.; Abundance (Eng.), 2 years.  
 Gwillim, Arthur, Churchbridge, Sec. 36, Tp. 21, R. 33, W. Prin. Mer.; Banner, 2 years.  
 Spencer, F. N., Craik, Sec. 1, Tp. 24, R. 28, W. 2nd Mer.; Banner, 1 year.

*Manitoba.*

Bradshaw, G. H., Morden, Sec. 3, Tp. 25, R. 6, W. Prin. Mer.; Banner, 3 years.  
 Collis, W. R. F., Shoal Lake, Sec. 30, Tp. 16, R. 24, W. Prin. Mer.; Abundance (Eng.), 1 year.  
 Cooper, A., Treesbank, Sec. 2, Tp. 8, R. 16, W. Prin. Mer.; Banner, 2 years.  
 Dow Bros., Gilbert Plains, Sec. 9, Tp. 25, R. 22, W. Prin. Mer.; Banner, 9 years.  
 Lumb Bros., Cartwright, Sec. 19, Tp. 3, R. 14, W. Prin. Mer.; Banner, 5 years.  
 Lumb, Geo., Cartwright, Sec. 19, Tp. 3, R. 14, W. Prin. Mer.; Abundance, 1 year.

*Ontario.*

Boyce, Geo., Merivale, Carleton County; Banner, 9 years.  
 Carmichael, Duncan, West Lorne, Elgin County; Ligowo, 5 years.  
 Carmichael, Duncan, West Lorne, Elgin County; White Lothian, 2 years.  
 Dixon, W. L., Dromore, Grey County; Banner, 9 years.  
 Free, Wm. H., Strathnairn, Grey County; Sensation, 1 year.  
 Gies, C. R., Heidelberg, Waterloo County; Newmarket, 7 years.  
 Gies, C. R., Heidelberg, Waterloo County; Daubeney, 1 year.  
 Goltz, Herman, Bardville, Muskoka County; Imported Scotch, 1 year.  
 Hunter, Jno., Wyoming, Lambton County; Poland White, 1 year.  
 Hyde, David W., Shakespeare, Perth County; Banner, 2 years.  
 Lawrence, Albert E., Fonthill, Welland County; American Banner.  
 Lewis, Wm., Dunsford, Victoria County; Siberian, 2 years.  
 Livingston, Lloyd, Minesing, Simcoe County.  
 Maccoll, Arch., Aldboro, Elgin County; Ligowo, 1 year.  
 Nicholson, Chester, Mt. Forest, Grey County; Banner, 3 years.  
 Northcott, S. A., Taunton, Durham County; New Sensation, 1 year.  
 Ontario Seed Company, Waterloo, Waterloo County; Abundance.  
 Ramage, W., Thistle, Grey County; Tartar King, 6 years.  
 Robinson, W. J., Oxdrift, Rainy River County; Banner, 1 year.



*Quebec.*

Boulet, Léonard, Dudswell Junction, Wolfe County; Banner, 3 years.  
 Cloutier, Michel, St. Pierre M., Montmagny County; Banner, 2 years.  
 Gagné, Joseph, L'Islet Station, L'Islet County; Banner.  
 Lafrenais, Stanislas, St. Jude, St. Hyacinthe County; Banner, 4 years.  
 Levasseur, Jérémie, Tessierville, Rimouski County; Banner, 10 years.  
 Levasseur, Jérémie, Tessierville, Rimouski County; Tartar King, 4 years.  
 Pintal, Gus, Champlain, Champlain County; Banner, 1 year.  
 Roy, Narcisse, Ste. Hénédine, Dorchester County; Banner, 4 years.

*New Brunswick.*

Ferguson, John, Murches, York County; Early Triumph, 10 years.  
 Hastings, Chas., Murray Road, Westmoreland County; Black Island, 2 years.  
 Innes, Donald, Tobique River, Victoria County; Early Blossom, 10 years.  
 Moore, Wm. H., Scotch Lake, York County; Banner, 10 years.  
 Palmer, Wm., Scotch Lake, York County; Banner, 9 years.

*Nova Scotia.*

Brown, Harry, Wallace Bay, Cumberland County; Banner, 6 years.  
 Brown, Harry, Wallace Bay, Cumberland County; Abundance (Reg.), 1 year.  
 Mackay, Robert, Balmoral Mills, Colchester County; Banner, 3 years.  
 McKay, Robert, Millsville, Pictou County; Manitoba, 9 years.  
 Wright, Wm. O., Dalhousie East, King's County; American Beauty, 7 years.

*Prince Edward Island.*

Arsenault, Elie E., Urbinville, Prince County; Old Island Black, 2 years.  
 Arsenault, Elie E., Urbinville, Prince County; Banner, 1 year.  
 Creed, Richard, Albion, King's County; Twentieth Century, 2 years.  
 Creed, Richard, Albion, King's County; Banner, 6 years.  
 Glydon, Turner, Margate, Prince County; Tartar King, 1 year.  
 Marchbank, Jas., New Annan, Prince County; Black Tartarian, 10 years.  
 Marchbank, Jas., New Annan, Prince County; Banner, 10 years.  
 McKenna, Michael, Newton, Prince County; Banner, 10 years.  
 Rodd, Ira L., North Milton, Queens County; Black Norway, 4 years.  
 Waugh, Thos. S., North Bedeque, Prince County; Banner, 7 years.  
 Wigginton, T. J., Bridgetown, King's County; White Egyptian, 8 years.

## BARLEY.

*Alberta.*

Carswell, E. E., Penhold, Sec. 34, Tp. 36, R. 27, W. 4th Mer; Mensury, 1 year.

*Saskatchewan.*

Black, W. M., Creelman, Sec. 9, Tp. 10, R. 10, W. 2nd Mer.; Mensury, 2 years.  
 Carter, R. H., Fort Qu'Appelle, Sec. 17, Tp. 21, R. 14, W. 2nd Mer.; Two-rowed,  
 2 years.  
 Carter, R. H., Fort Qu'Appelle, Sec. 17, Tp. 21, R. 14, W. 2nd Mer.; Six-rowed, 2  
 years.  
 Funk, Abr., Tiefengrund, Sec. 20, Tp. 44, R. 4, W. 3rd Mer.; Standwell, 2 years.



*Manitoba.*

Bradshaw, G. H., Morden, Sec. 3, Tp. 25, R. 6, W. Prin. Mer.; Mandscheuri, 4 years.  
Lumb Bros., Cartwright, Sec. 19, Tp. 3, R. 14, W. Prin. Mer.; Mensury, 5 years.

*Ontario.*

Carmichael, Duncan, West Lorne, Elgin County; Mensury, 7 years.  
Carmichael, Duncan, West Lorne, Elgin County; Mandscheuri, 5 years.  
Gies, C. R., Heidelberg, Waterloo County, Mandscheuri, 4 years.  
Hartman, Walter, Clarksburg, Grey County; Mandscheuri, 1 year.  
Maccoll, Arch., Aldboro, Elgin County; Mensury, 4 years.  
Mackey, Chas., Kinsale, Ontario County; Mandscheuri, 7 years.  
McCallum, John, Shakespeare, Perth County; No. 21, 3 years.  
Northcott, S. A., Taunton, Durham County; No. 21, 1 year.  
Tucker, H. S., Chapman, Hastings County; Oderbrucker, 3 years.  
Weeks, H. M., Glencoe, Middlesex County; No. 21

*New Brunswick.*

Innes, Donald, Tobique River, Victoria County; Mensury, 5 years.

*Nova Scotia.*

McKay, Robert, Millsville, Pictou County; Mensury, 3 years.

*Prince Edward Island.*

Creed, Richard, Albion, King's County; Mensury, 3 years.  
Wigginton, T. J., Bridgetown, King's County; Mensury, 2 years.

## INDIAN CORN.

*Ontario.*

Barnet, W. A., Harrow, Essex County; Reid's Yellow Dent, 1 year.  
Carmichael, Duncan, West Lorne, Elgin County; Reid's Yellow Dent, 3 years.  
Carmichael, A., West Lorne, Elgin County; King Phillip.  
Coatsworth, G. W. & Son, Kingsville, Essex County; Reid's Yellow Dent, 2 years.  
Coatsworth, J. H., Ruthven, Essex County; Yellow Dent (Hybrid), 2 years.  
Duke, J. O., Olinda, Essex County; Stowell's Evergreen, 6 years.  
Fletcher, J. A., Valetta, Kent County; Compton's Early.  
Hankinson, L. D., Grovesend, Elgin County; Yellow Flint (str.), 5 years.  
Hunter, Jno., Wyoming, Lambton County; White Cap Yellow Dent, 2 years.  
Maccoll, Arch., Aldboro, Elgin County; Compton's Early, 1 year.  
Maccoll, Arch., Aldboro, Elgin County; White Cap Yellow Dent, 1 year.  
McKee, Jno., Norwich, Oxford County; Stowell's Evergreen, 3 years.  
Ontario Seed Company, Waterloo, Waterloo County; Devitt's Early.  
Pearce Chas., Wellington, Prince Edward County; Stowell's Evergreen (early str.), 5 years.  
Pearce, Jno. P., Staples, Essex County, Leaming, 2 years.  
Sovereign, L. A., Round Plains, Norfolk County, Early Crosby sweet, 1 year.  
Smith, B. A., Ruthven, Essex County; White Cap Yellow Dent, 1 year.  
Thompson, Robt., St. Catharines, Lincoln County; White Cap Yellow Dent, 2 years.  
Thomas, J. C., Blytheswood, Essex County; White Cap Yellow Dent, 5 years.  
Woodbridge, A. H., Kingsville, Essex County; Reid's Yellow Dent, 2 years.



*Quebec.*

Lafrenais, Stanislas, St. Jude, St. Hyacinthe County; Western Beauty, 3 years.

*Nova Scotia.*

Chute, Manning, Berwick, King's County, Native Yellow, 2 years.

McKay, Robert, Millville, Pictou County, White Flint, 1 year.

## PEASE.

*Ontario.*

Talbot, Robert, Everton, Wellington County; Golden Multipliers, 1 year.

*New Brunswick.*

Innes, Donald, Tobique River, Victoria County; White Marrowfat, 4 years.

*Nova Scotia.*

McKay, Robert, Millville, Pictou County; Canadian Beauty, 1 year.

*Prince Edward Island.*

Creed, Richard, Albion, King's County; White Marrowfat, 3 years.

## POTATOES.

*Saskatchewan.*

Saunders, W. J., Marshall, Sec. 22, Tp. 48, R. 26, W. 3rd Mer.; Up-to-date.

Spencer, F. N., Craik, Sec. 1, Tp. 24, R. 28, W. 2nd Mer.; British Queen, 1 year.

Willoughby, W. D., Shell Brook, Sec. 28, Tp. 49, R. 4, W. 3rd Mer.; Reeve's Rose, 1 year.

*Manitoba.*

Orchard, Harold, Lintrathen, Sec. 4, Tp. 6, R. 6, W. Prin. Mer.; Honey Eye Rose, 4 years.

Orchard, Harold, Lintrathen, Sec. 4, Tp. 6, R. 6, W. Prin. Mer.; Sunrise, 3 years.

Orchard, Harold, Lintrathen, Sec. 4, Tp. 6, R. 6, W. Prin. Mer.; Vermont Gold Coin, 1 year.

*Ontario.*

Canning, Robert, Hagerman, York County; Carman No. 1, 2 years.

Canning, Robert, Hagerman, York County; Vermont Gold Coin, 2 years.

Crosby, R. H., Markham, York County; Carman No. 3, 1 year.

Crosby, R. H., Markham, York County; Empire State, 1 year.

Hutchinson, Alfred, Mount Forest, Wellington County; Empire State, 3 years.

Krouse, F. W., Guelph, Wellington County; First Choice.

Lawrence, A. E., Fonthill, Welland County; Uncle Sam.

Macoun, W. T., Experimental Farm, Ottawa; Carman No. 1, 2 years.

Richardson, J. E., Wallaceburg, Kent County; Carman No. 1, 1 year.

*Quebec.*

Lafrenais, Stanislas, St. Jude, St. Hyacinthe County; Rural New Yorker, 2 years.

Taylor, Wm. H., St. Giles, Lotbinière County; Sensation, 2 years.



*New Brunswick.*

Buchanan, H. D., Sussex, King's and Albert Counties; Carman No. 1, 1 year.

*Nova Scotia.*

Brown, Harry R., Wallace Bay, Cumberland County; Green Mountain, 4 years.

McKay, Robert, Millsville, Pictou County; Beauty of Hebron, 2 years.

McNeil, Dan. C., Brophys, Antigonish County; Dreer's Standard, 1 year.

*Prince Edward Island.*

Creed, Richard, Albion, King's County; Early Harvest, 3 years.

Wiggington, T. J., Bridgetown, King's County; McIntyre, 2 years.







## MINUTES OF SIXTH ANNUAL MEETING OF THE CANADIAN SEED GROWERS' ASSOCIATION.

The sixth annual meeting of the Canadian Seed Growers' Association was held at Ottawa, Ont., on February 10 and 11, 1910, the day sessions being held in the Seed Laboratory, Canadian building, and the evening session in the Carnegie Library Hall. The opening session of the convention came to order at the call of the president at 2 p.m., February 10.

After expressing his pleasure at being able to be present, the president asked the secretary to read the minutes of the last annual meeting. Since these were in printed form in the regular report, it was moved and seconded that they be taken as read.—Carried.

The secretary having no communication requiring special consideration at this stage of the meeting, the president called for the report of the board of directors of the association.

### REPORT OF THE BOARD OF DIRECTORS.

*Presented by the Secretary.*

Mr. CHAIRMAN AND GENTLEMEN,—Your directors have the honour to submit herewith their sixth annual report on the operations of the association. It is with deep regret and sorrow that we record the death of Mr. W. L. Davidson, who, since the formation of the Association, had been one of its faithful and helpful members. Your directors by this means express their deep appreciation of the fine character and useful labours of Mr. Davidson for the improvement of agriculture and betterment of rural conditions generally, particularly in his own province of Quebec.

Since the last annual meeting several important steps have been taken toward placing the work of the association on a broader basis and a higher plane. Perhaps the most important action has been that of encouraging our best growers to adopt a scheme for multiplying their commercial supplies of seed as a means of solving the problem of supply.

It has also been the aim of the association to make the business of seed growing as profitable as can be expected for the individual grower. We believe that continued success will depend very largely upon the profits which accrue from the extra work incurred in carrying out the regulations of the association. In all our work we have had a two-fold purpose: first, to ensure a permanency of practical service to the country, and secondly, to influence through example, demonstration and through our literature, a more general interest in the use of better seed. What we have accomplished during the year is given in detail in the report of the secretary. A careful examination of this report will show that substantial progress has been made and that the work is now well organized and in a condition calling for further extension. We recognize that the association owes much to the cordial and most helpful co-operation which it has received from the Seed Branch of the Department of Agriculture and also from the experimental farms, agricultural colleges, and the various provincial organizations and the press.

Your directors further recommend,—

(1) That subsection 1, section 33, be amended by striking out the words 'standing plants' and substituting therefore the word 'crops.'



(2) That the executive be authorized to secure seed of outstanding merit to supply in small quantities to applicants for membership or to regular members, to be used by them under conditions as may be determined by the executive.

Your directors warmly appreciate the financial support granted by the Government through the Department of Agriculture and recommend that a resolution from this convention, expressing that appreciation and the hope of a continuation of the necessary aid, be forwarded to the Minister.

The CHAIRMAN.—May I offer one or two words of explanation regarding the recommendations of the directors. The first recommendation advises the alteration of one of the by-laws. By-law No. 33 requires that the selection of seed for the hand-selected seed plots of the following season be made from standing plants found growing in the plot. It has been found difficult in many cases for the farmer to make or take the time to do that work well, in the midst of pressure from weather, ripening grain and duties which are heaviest on him for attention. He cannot hire adequate help. Many men say that if they had the privilege of making selections after the grain is in the sheaf, they could do it. Therefore, without altering substantially the restrictions or standards of the association, we should like to give the farmers this additional facility by changing the words 'standing plants' to 'crops.' Then members may select from the standing plants in the field or from the sheaves in the barn.

In the matter of the second recommendation, we think that if a quantity of seed of recognized merit could be secured from one plant of special excellence, and multiplied till a quantity of that seed is available, many farmers would become members of the association and would begin with half a bushel, if they could get that quantity. We have thought that no better use could be made of a small amount of money than to acquire a few bushels of such seed, have it grown under competent supervision, and make the product available for foundation stock. We think that would be a good way to use a small amount of money.

I need not say much about the third recommendation. We desire to report to the Minister of Agriculture our gratitude and our appreciation—looking back to good work done and looking forward to more good work to be done. I move the adoption of the report of the directors.

Mr. THOMPSON.—I beg to second the resolution. It seems to me that the measure of success of this organization will depend upon the extent to which it is able to identify itself with the work of crop-growing by the average farmer, and therefore the modification of the rules, I think, is a step in the right direction. It makes it easier for the work to be taken hold of by a greater number of persons. I had the pleasure of being present at the christening of this organization and am delighted to be here at its sixth anniversary to-day. I have thought that some of us should have been making more rapid progress than we have made, in developing the commercial side of the business. The executive might take hold of growing crops on a larger scale than is suggested in these amendments, and I would suggest the practicability of demonstrations. I know from some experiments with orchards that wonderful results have been accomplished, and I believe Dr. Robertson would be in favour of broadening out the work of the association in that way. Its results would be accomplished more rapidly. It is a fortunate thing that at this period of Canadian history, men of foresight and courage have been able to project organizations like this. The 20th century is said to be the century of Canada. I feel like saying that the 19th century was the century of the city, and that the 20th century is the century of the farmer. I think that is a sentiment that should appeal to us.

Mr. MACOUN.—I can see that a man would have an advantage in selecting the heads after taking the whole crop inside; but he would have no means of knowing whether the best heads came from plants inside the plot or from rows on the outside of the plot. More effective work would be done if he were restricted to the plants that came from the inside of the plot.



Mr. INNES.—If one wanted to take the stooling of the plant into consideration he would not know from the sheaves whether the plant was a stooling or a non-stooling one. Apart from that, I think it is a step in the right direction.

The CHAIRMAN.—I would like to make one observation in regard to the remark of Mr. Macoun. Mr. Macoun has eyes in his mind trained about as well as he has trained the eyes in his body, and not much escapes his observation. There is some risk of the hand selector being misled by the merely large plant, and I think, perhaps, the point would be covered better by explanatory notice from the secretary than by restrictions in the by-laws. Advice to the grower would guide him, and it need not be put into the by-laws that he must select only from some particular part of the plot. That would be my preference. On the question of the stooling of plants and not being able to distinguish the stooling from the non-stooling in the sheaves, I would ask Mr. Zavitz to speak.

Prof. C. A. ZAVITZ.—This matter came up in the directors' meeting this morning. After considering it, we thought perhaps there would not be much disadvantage in making the change. I think you will understand that when grain is sown in the field in the ordinary way, there is quite an irregularity in the distribution of the plants. One seed may be dropped by itself, with another single seed four or five or six inches or a foot from it; and then probably there will be two or three or four close together. That is the result of sowing broadcast or in drills. This irregularity in distances between the plants would have a wonderful influence on the stooling of those plants. We have found in the case of Joannette oats, for instance, when we put the seeds a foot apart, we had an average of over 21 stools from each seed; and when we put the seeds of the same variety close together we did not get a single stool from the main stalk. The stooling depends a great deal on the even distribution of the seed. It is difficult to go into the field and determine much in regard to the stooling of grain.

Mr. T. G. RAYNOR.—One thought came to mind in regard to Prof. Macoun's objection about getting too many heads from the outside of the plot. What would be the regulation plot? For instance, I have found the plot in the orchard, I have found it in the garden, and I have found it running the whole length of the field. If there was a regulation plot, I think it would be better. There would not be so many outside plants taken for future breeding plots. I think this is a wise change that has been decided upon by the directors. Many men are ready to undertake the work, but when they have to select the seed at the busy season of the year, they throw the work up. Some men are giving it up for that reason. I believe this change will overcome a difficulty and will enable more men to follow this work.

The motion to adopt the report was carried.

A motion that the Chair appoint committees on resolutions and on nominations was carried.

The CHAIRMAN.—I nominate Prof. Klinck, Mr. Wheaton and Mr. Thompson as a committee of three on resolutions, and Mr. Gigault, Prof. Zavitz and Mr. Mooney as a committee on nominations.

We will now have the report of the secretary-treasurer.

## REPORT OF THE SECRETARY.

(*L. H. Newman, B.S.A.*)

MR. PRESIDENT AND GENTLEMEN,—I have the honour of presenting herewith my report as secretary-treasurer of the Canadian Seed Growers' Association for the year ending March 31, 1910.

The report of the last annual meeting of the association has been printed to the extent of 20,000 English copies and 5,000 French.

We have had many demands for these reports from individual farmers as well as experts and high officials in the United States and other foreign countries.

Since its inception the work of the association has been advancing gradually. The past season has been one of special encouragement. The number who have signified a desire to take up special work under the association has increased, the general interest of the farming community in the matter of good seed has grown, the results of the work have demonstrated the importance of making a careful and systematic choice of seed more than ever before, the demand for registered seed has greatly increased not only from among our own people in Canada but from seedsmen and others in foreign countries, and the attempt to meet this demand on the part of the various growers has taken a more serious and businesslike form. All this augurs well for the future of the association.

During the season of 1909 satisfactory hand selections of seed were made by 123 growers. Of this number 87 have already been admitted into the association in full standing, so that there remain 36 who are now entitled to formal admission. The names of these persons are as follows:—

A. E. Lawrence, Fonthill, Ont.  
L. Boulet, Dudswell Junction, Que.  
Wm. Barnett, Elfros, Sask.  
W. A. Barnet, Harrow, Ont.  
J. A. Fletcher, Valetta, Ont.  
H. Goltz, Bardsville, Ont.  
Percy Hopkins, Anerley, Sask.  
F. W. Krouse, Guelph, Ont.  
A. Perry, Cardston, Alta.  
J. E. Richardson, Wallaceburg, Ont.  
L. A. Sovereign, Round Plains, Ont.  
F. N. Spencer, Craik, Sask.  
R. Talbot, Everton, Ont.  
John Weiner, Miami, Man.  
H. M. Weekes, Glencoe, Ont.  
Otto Herold, Waterloo, Ont.  
W. J. Robinson, Oxdrift, Ont.  
S. A. Northcott, Taunton, Ont.  
R. H. Crosby, Markham, Ont.  
H. D. Buchanan, Sussex, N.B.  
Jas. Brown, Arcola, Sask.  
E. Carswell, Penhold, Alta.  
W. H. Free, Strathnairn, Ont.  
W. Hartman, Clarksburg, Ont.  
Fred Ind, Lloydminster, Sask.  
Dan C. McNeil, Brophys, N.S.





FIG. 1.—Plots of wheat and oats grown by S. Wheeler, Rosthern, Sask.



FIG. 11.—Plots of potatoes grown by S. Wheeler, Rosthern, Sask.

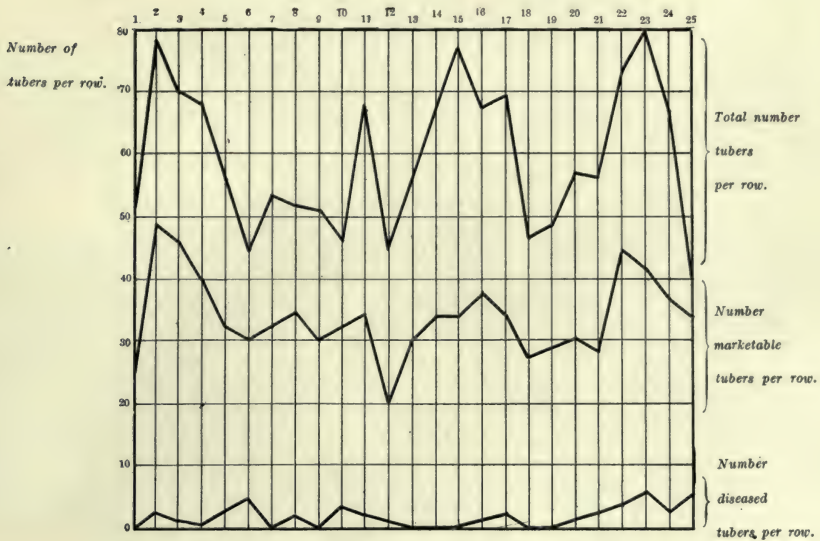




# POTATO YIELDS.

DIAGRAMS SHOWING VARIATION IN YIELD OF INDIVIDUAL ROWS OF  
POTATOES GROWN ON SPECIAL SEED PLOTS IN 1909:

CARMAN NO. 1—(BY R. H. CROSBY, MARKHAM, ONT.)



EMPIRE STATE—(BY R. H. CROSBY, MARKHAM, ONT.)

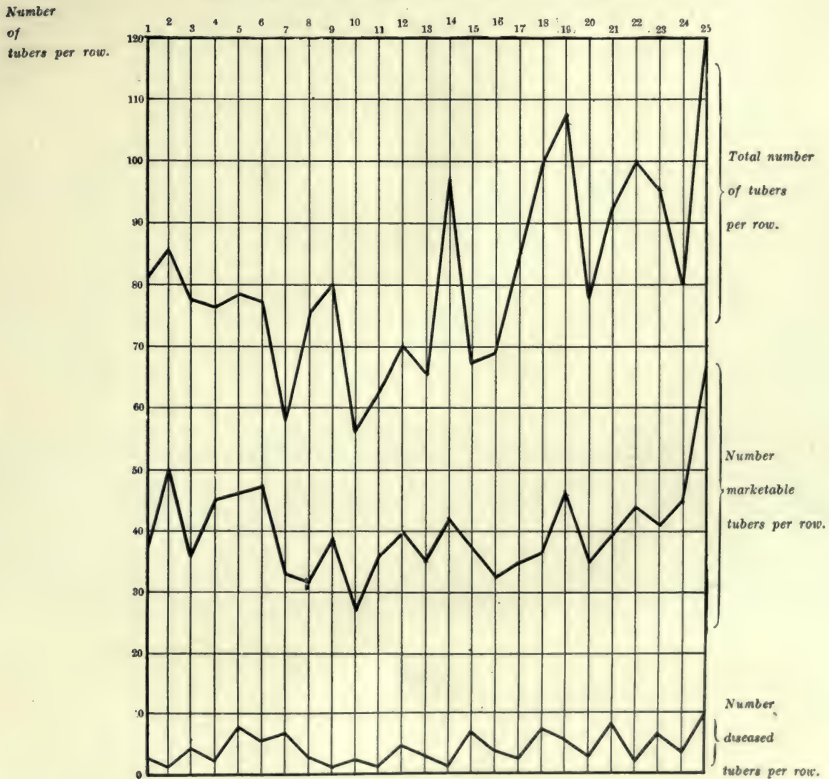








FIG. IV--Plot of Empire State potatoes, grown by A. Hutchinson, Mount Forest, Ont.



FIG. V--Plot of onions grown for seed in Waterloo County, Ontario.





**DIAGRAM SHOWING VARIATION IN YIELD OF INDIVIDUAL ROWS OF  
POTATOES GROWN ON SPECIAL SEED PLOTS IN 1909:**

**CARMAN NO. 1—(GROWN NEAR SUSSEX, N.B.)**

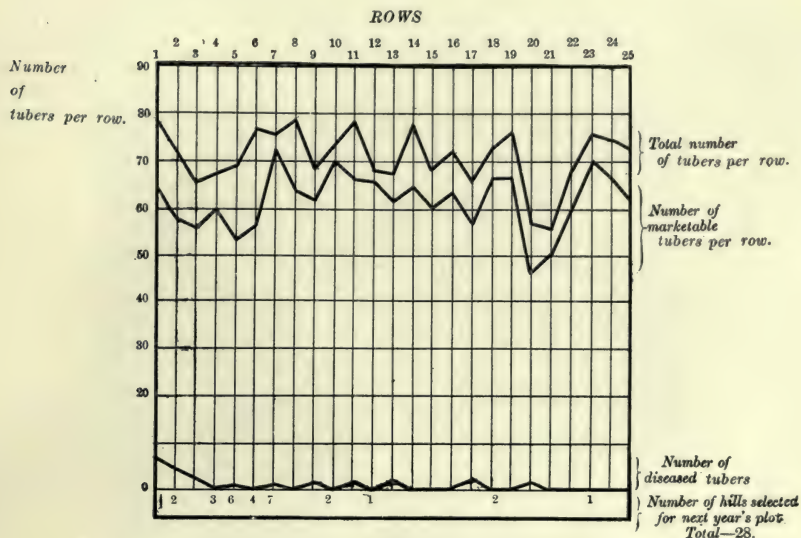


FIG. VI.

**EARLY HARVEST. GROWN NEAR ALBION, P.E.I.**

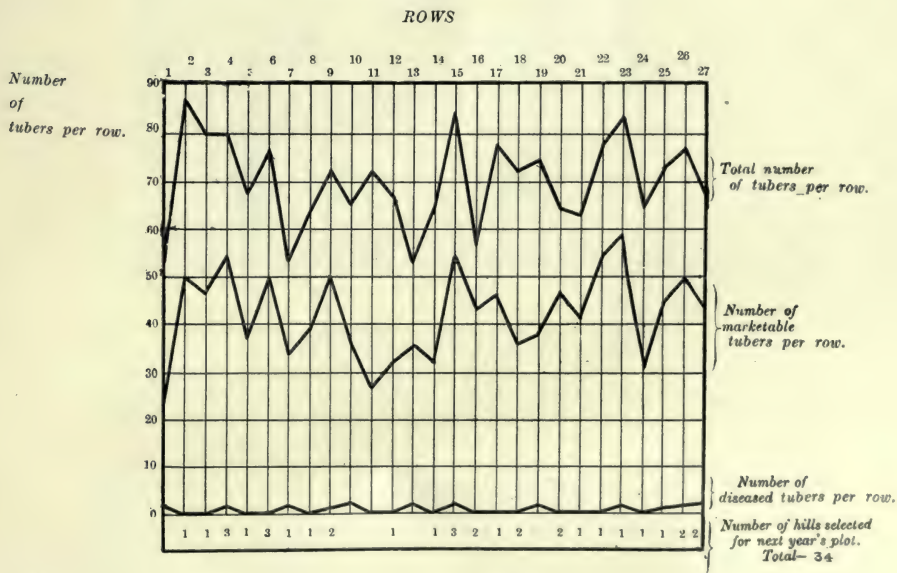


FIG. VII.







1	2	3
FIG. VIII—1. Head of Black Tartarian Oats—P. E.		
2. Head of No. 21 Barley (6-rowed.)		
3. Head of 2-rowed Barley.		







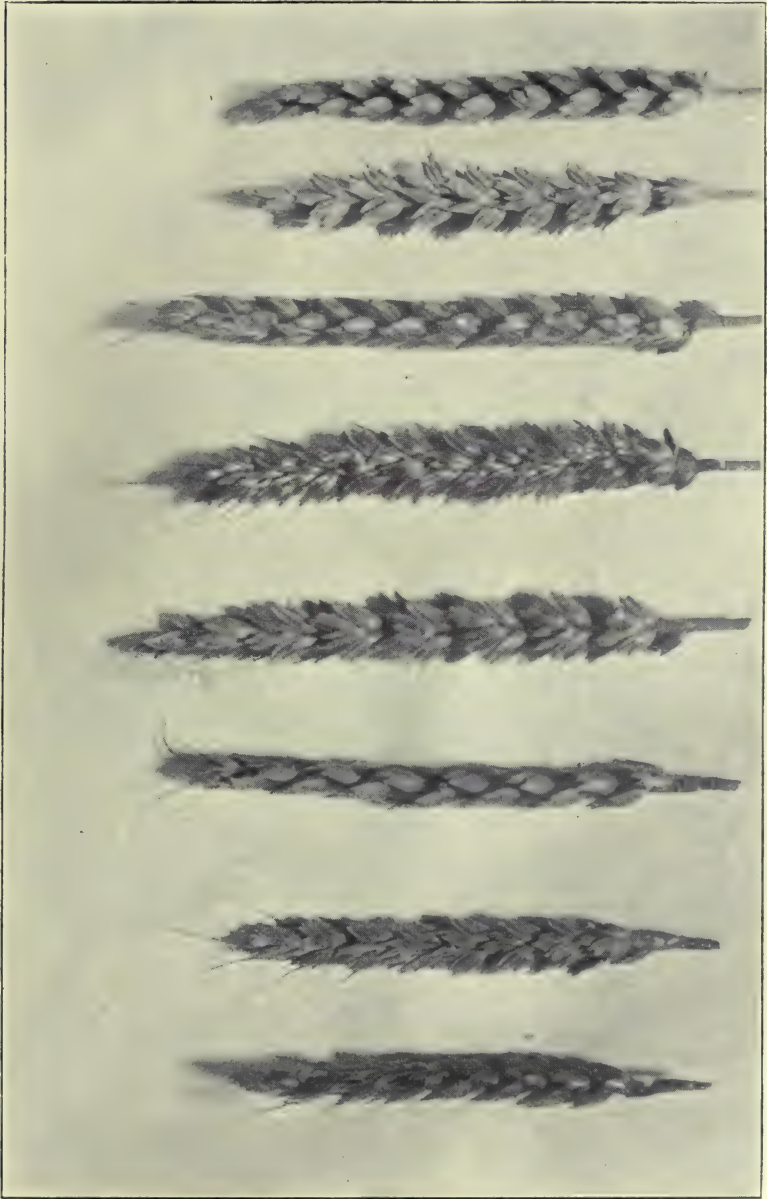
FIG. IX—Experimental and breeding plots at the O. A. C., Guelph, Ont., from which place come many of our best foundation stocks.



FIG. X—Special seed plot of Preston wheat grown by S. Wheeler, Rosthern, Sask. Stock seed secured originally from the Central Experimental Farm, Ottawa, Ont.







Marquis.

Dawson's Golden Chaff  
(fall wheat).

White Russian.

Red Fife.

Fig. XI.—Heads of Leading Varieties of Wheat.







FIG. XII—Stalk on left shows ear borne too high (6' 8" from ground). Stalk on right shows more desirable type of plant with ear borne at about proper height.



REID'S YELLOW DENT CORN.

FIG. XIII—Stalk on left bearing two ears of poor type. Stalk on right bearing one good ear at about proper height. This is preferable.





R. Parsons, Glenavon, Sask.  
 Jas. R. Stewart, Gladstone, Man.  
 B. A. Smith, Ruthven, Ont.  
 O. W. Stauffer, Didsbury, Alta.  
 W. W. Thompson, Riga, Sask.  
 Seager Wheeler, Rosthern, Sask.  
 W. D. Willoughby, Shell Brook, Sask.  
 Geo. Lumb, Cartwright, Man.  
 L. A. Arsenault, Urbinville, P.E.I.  
 A. W. McDonnell, Loughheed, Alta.

Those who have applied for assistance and direction in conducting special work in seed selection on their farms, but who have not yet qualified to become members in full standing, are classified as follows:—

## APPLICANTS.

	Mar. Dist.	Que.	Ont.	Man.	Sask.	Alta. and B.C.	Total.
Seed wheat growers.....	25	9	25	15	53	20	147
Seed oats growers.....	27	28	44	14	24	19	156
Seed barley growers.....	6	4	23	9	7	5	54
Growers of seed corn.....	1	2	66	0	0	0	69
Growers of seed potatoes.....	17	1	31	0	8	5	62
Applicants not yet specifying crop.....	4	13	8	1	2	2	30
Growers of seed of miscellaneous crops, such as beans, pease, etc.....	5	6	7	2	2	3	25
Total .....	85	63	204	41	96	54	543

A great many growers operate with more than one class of crop so that the above table does not indicate the actual number of applicants interested, but rather the relative interest taken in the various crops. The following statement indicates the exact standing of the association in so far as actual numbers are concerned.

## SUMMARY.

Total number on application list before revision.....	463
Number of applicants removed from list of active operators.....	73
Number of applicants removed to membership list.....	36
“ of applicants remaining on list.....	354
“ of members reporting satisfactorily.....	87
“ of members failing to make satisfactory selections.....	52
Number of old members dropping the work.....	10
“ of new members reporting satisfactorily.....	42
Total number of members in full standing.....	36
Total number now affiliated with the association.....	165
	519

During the past year ninety-four applications for membership have been received. Some of these have been able to qualify this year, while others will require at least another year before they are eligible to be admitted as members in full standing.

## INSPECTION OF SEED PLOTS.

The Seed Branch of the Dominion Department of Agriculture has again been able to include the active members of our association with those listed for personal visitation by its various officers during the growing season of the past year. Careful notes have been taken by these officers on the operations of those visited and reports have been forwarded to the headquarters of the association indicating very minutely the showing made by each plot, its merits and defects and the apparent interest and progress of the operator.

Practically all the special work that is being done by members of this association with corn was inspected by your secretary, who took advantage of the opportunity to make a close study of the whole corn growing situation. Seventy-three special plots were inspected during his itinerary. Special reference will be made to this later.

The following is a summary of the work of inspection for the season of 1909:—

	Mar. Dist.	Que.	Ont.	Man.	Sask.	Alta. and B. C.	All prov- inces.
(1) Number of growers on inspector's list prior to beginning work of inspection.	85	62	199	49	87	50	533
(2) Number answering inquiry cards and stating they were operating, or that they wished to be visited.....	30	21	55	29	35	11	182
(3) Total number visited by inspectors.....	30	16	64	29	14	10	163

### CONDITION OF THE WORK OF THE ASSOCIATION IN THE DIFFERENT DISTRICTS.

#### IN ALBERTA AND BRITISH COLUMBIA.

There has been a considerable increase in the activity and interest taken in the work of the association in Alberta during the past season. In British Columbia the association does not as yet occupy a prominent place, although there is ample room for good individual work with many crops, notably potatoes.

The crops which are receiving the greatest attention in Alberta are spring wheat, oats, fall wheat and barley. In oats the Banner variety remains the most popular. In spring wheats the Red Fife continues to hold first place, although other earlier varieties are being tested and may gain a relatively higher place. In fall wheats the Turkey Red is most in favour in the south, while the Dawson's Golden Chaff seems to be preferred in the northern districts. Very little special work has been done with barley, although the opportunities for developing more satisfactory strains are abundant. During the past year a good deal of interest has been taken in the brewing industry by certain individuals and corporations who are quite optimistic regarding the possibilities for developing special strains which are eminently suited for brewing purposes. The Canadian Pacific Railway Company imported from the Bozeman Agricultural College, Montana, a small quantity of Chevalier barley, known locally as the 'Manhattan' barley, and sowed it last spring on carefully prepared ground. A selection has been made from the crop produced and the seed secured will be sown in another plot this year in accordance with our regulations.

The climatic conditions for the year may be summarized as follows:—In the north, spring opened two weeks later than usual, but growth was rapid once it started. The precipitation for the season was below the average, but not seriously so. Hail did considerable damage in some northern localities in early August.



In the southern part of the province, where the bulk of the fall wheat is produced, a good deal of this crop was winter-killed. The season as a whole is described as unusual; spring late and cold, and summer dry.

The experimental farms at Lethbridge and Lacombe, representing the southern and northern parts of the province respectively, are proving valuable in pointing the way to proper methods of tillage, rates of seeding and varieties suited to the districts. The work done at Lethbridge for the past two years with fall wheat, together with the experience of those who have grown this crop for five or six years, suggests the importance of sowing rather more thinly than usual where winter killing is liable to occur, it being considered unsafe to use more than one bushel to the acre in these districts.

#### IN SASKATCHEWAN.

The work of the association in the province of Saskatchewan is extending slowly but surely.

The crops receiving the greatest attention by our members are wheat, oats, barley and potatoes, in the order named.

According to provincial statistics, there were 3,912,497 acres of wheat under cultivation in Saskatchewan during the past season. This acreage required approximately 5,868,745 bushels of seed in the spring of 1909. Some of the seed used was doubtless of very fair quality, while a good deal was not of the sort that produces maximum yields.

In spring wheats, the Fifes are still most popular, although a good deal of interest is being shown in the earlier types which are being sent out from the experimental farms. In some of the later districts special selections of Preston are proving considerably superior to the original stock, while such varieties as Stanley A, Red Fife H and Marquis promise to become useful. The opportunities for selecting and developing early strains from high quality varieties, such as the Fifes, seem to be exceptionally promising. The work of Dr. Saunders and some of our own growers along this line is very encouraging.

The acreage devoted to oats in Saskatchewan is growing rapidly, the increase in 1909 over the previous year being double that made in wheat. Greater attention should be given the quality, purity and productive capacity of the oats that are used for seed. Oats respond quickly to careful selection and the majority of the kinds used at present are capable of being greatly improved. Our greatest need as an association is for a larger number of growers who will take up the production of registered seed oats on a comparatively large scale.

The varieties of oats most in favour in Saskatchewan are Banner and Abundance, although there are many other varieties grown throughout the province.

Barley is growing in popularity, although the acreage devoted to it is still very small in comparison with that devoted to wheat and oats. The demand for clean, well-bred seed barley is increasing. In the older parts of the west, notably in Manitoba, barley is being grown quite largely as a cleaning crop, especially where wild oats are bad. This is likely to promote considerable interprovincial trade in seed, owing to the comparative purity of Saskatchewan grown grain.

The barley with which special work is being done in Saskatchewan is almost altogether of the Mandscheuri or Mensury variety, although some growers are working with two-rowed types, their aim being to develop strains suitable for brewing purposes.

A selection from Mandscheuri barley made by Prof. C. A. Zavitz, O.A.C., Guelph, Ont., and designated as 'No. 21' has been introduced in a few places with good results. This strain seems to excel the mother variety in the uniformity with which it matures and in the evenness of the crop in general.

The weather conditions of the province for the season were peculiar. Seeding was from two to three weeks late, the precipitation was greater than usual but the larger

part of it came in July. The temperature for July and August was above the average so that with the extra moisture growth was very rapid. In some districts there were heavy storms which were followed by intense heat, a condition favourable to the development of rust. Harvesting was general throughout most of the province by August 23, so that despite the late spring the grain grew and ripened in record time.

#### IN MANITOBA.

The work of the association in Manitoba is on a substantial footing. Although the membership is not large, the character of the operators is such as to offset, to a considerable extent, any deficiencies in numbers, and excellent work is being done. There should be a greater number engaged in this sort of work, and we are adopting every available means of encouraging as many of the best grain growers as possible to affiliate themselves with us. According to statistics, there were 2,808,000 acres of wheat, 1,390,000 acres of oats and 696,000 acres of barley under cultivation in Manitoba during the season of 1909. To sow these areas required approximately 4,212,000 bushels of seed wheat, 2,780,000 bushels of oats and 1,044,000 bushels of barley. While much of the seed used was doubtless of fair quality, yet it is safe to say that there was lacking in a great deal of it the inherent capacity to produce large yields. 'Better-bred seed' is one of the crying needs of the hour if Manitoba is to maintain her reputation as a great grain growing province.

The crops receiving greatest attention from our members are wheat, oats, barley and potatoes, in the order named. In wheat, the Fifes still retain their popularity, although early varieties such as Preston, Stanley and Marquis, are receiving considerable attention in the later districts.

In oats, the Banner variety is to the front as usual and seems to retain this position with little difficulty. The Abundance has given good results in some places, but has not yet proven itself superior to Banner as a general variety.

Mandscheuri and Mensury are the only varieties of barley grown by our members.

The weather conditions in Manitoba for the season were quite favourable as a whole. While the spring was late and backward and seeding was much delayed, unusually propitious weather followed with the result that harvesting began about the usual time. Some districts suffered from lack of moisture in late July with the result that the plumpness of the grain was somewhat affected.

#### IN ONTARIO.

In the province of Ontario the growth of the association is gradual and steady.

Many growers are experimenting with varieties in order to determine the best sorts for foundation stock. This is very important as many years of work may often be saved by going slowly at first and making a careful choice of variety based on actual test.

The crops receiving the greatest attention are corn, oats, barley, wheat and potatoes in the order named.

Our work with corn has received an immense impetus during the past year and overshadows the work done with all other crops in the province. The factors which were responsible for this will be referred to later.

Oats occupy first place in Ontario as a general grain crop; there were over 3,000,000 acres devoted to this crop in the province in 1909. The demand for seed oats grown in Ontario under our supervision has greatly increased, and there has been a greater attempt to meet that demand than ever before. No new varieties worth mentioning have been introduced during the year, the old Banner still retaining first place, although such varieties as Sensation, Newmarket Siberian, Ligowo and Daubeney are giving good satisfaction in some districts. The Tartar King variety which has been grown more or less for a number of years seems to be falling into disrepute in certain sections and is being replaced by such varieties as the Banner and Siberian.



There is a demand for early maturing varieties such as the Daubeney for mixing with six-rowed barleys and we are endeavouring to induce a number of members to undertake the growing of this variety in considerable quantities.

Approximately 6,000,000 bushels of seed oats are required annually to sow the area devoted to this crop in Ontario. Our association produced last year 2,006 bushels of which 1,067 bushels have been offered for sale. Our present need is for a greater number of growers who will take up the work as a business proposition with a determination to turn out several hundred bushels of registered seed each year.

The importance of the barley crop in the province is such as to warrant greater attention being paid to the quality of the seed that is being used. Statistics give the acreage devoted to this crop in 1900 as 721,500 acres with a market value of the crop produced of over \$11,000,000. The yield per acre is given as 29.04 bushels for the year while the average for 27 years is placed at 27.7 bushels. The opportunities for improvement in this crop and for the commercial production of registered seed are alike inviting.

The varieties most in favour with our growers are the Mandscheuri, No. 21, Mensury and Oderbrucker. During the past year considerable attention has been given the No. 21 variety, which seems to be surpassing the mother variety—the Mandscheuri—in some essential particulars, notably in uniformity.

The value of the wheat crop of Ontario is centred largely in the fall varieties, which occupy more than twice the acreage devoted to the spring varieties. Of the latter class, Red Fife is practically the only variety receiving special consideration.

Among the fall varieties Dawson's Golden Chaff and Abundance hold first place and are receiving considerable special attention at the hands of our growers. The honour of receiving the first certificate of registration vouching for 10 years of continuous selection according to the rules of our association falls to the Dawson's Golden Chaff variety, grown and selected all this time by Mr. C. R. Gies of Heidelberg, Ont.

The potato crop of Ontario does not occupy the position commercially that it might. Potatoes are grown on practically every farm to some extent but in comparatively few places are they produced in any considerable quantity. However, more attention has been given this crop within the past two or three years, due largely to the efforts that have been made by institute speakers and agricultural institutions to show that this crop may be made an excellent money maker when proper methods and suitable labour-saving machinery are introduced.

The growing of early potatoes for the early market is being carried on quite extensively in some sections, the Early Ohio and Six Weeks being among the most popular varieties.

Among the late varieties worked with at present Carman No. 1 holds first place, although such varieties as Vermont Gold Coin and Empire State are preferred in some districts. The difference between varieties in their ability to yield a large number of marketable tubers has been demonstrated on every hand during the past season. Fig. III shows not only a variation in yield between the individual rows planted on a special plot with tubers taken from separate hills, but also shows the difference in total yield, yield of marketable tubers and of diseased tubers between Carman No. 1 and Empire State grown side by side on the same farm.

Fig. IV represents an excellent plot of potatoes of the Empire State variety grown by Alfred Hutchinson, Mount Forest, Ont. Mr. Hutchinson has described his work with the potato in a paper entitled 'Some Results Obtained in the Improvement of the Potato.' This paper will be found on page 94 of this report.

Figs. VI and VII represent variations in yield between single rows planted with tubers taken from different hills the year previous.

#### IN QUEBEC.

Considerable progress has been made in the province of Quebec during the year, not only in results realized by our regular members but in the interest taken in the

association by the people generally. A greater number of applications for membership have been received than in any previous year, due largely to the interest created by the field crop competitions which have proven such a splendid success during the past year. The competitions have not only created an interest in the question of good seed but they have offered a medium through which to secure the names of many of Quebec's best seed growers.

The need for special work in Quebec is everywhere apparent. There is need for more educational work in the rural communities; need for greater confidence on the part of the Quebec farmer generally in the value of home-grown seed and need for a source of supply of this seed. Until we create a larger supply of really first class seed in Quebec and encourage the dissemination of this seed throughout the province, there is not likely to be a great change from the present method of bringing in seed from other provinces. In some sections of the province mixed grains are grown, the seed being brought in in quantity and mixed for seeding. Since the average oat does not mature with our ordinary six-rowed barley, a considerable loss is sustained where these mixtures are grown. Those wishing to grow mixed crops have been advised to choose varieties which ripen well together and then grow their own seed of these varieties on their own farms and mix in proper proportions each year.

The question of variety is one which has been very largely ignored by the average Quebec farmer and applicants for membership in the association seem to give this important matter very little consideration until it is brought to their attention. An examination of the report prepared by the Seed Branch giving the results of the recent field competitions held in Quebec will show that in a large percentage of cases the name of the variety being grown was not known. This is a condition of things which should be remedied.

The crops receiving the greatest attention at present are oats, spring wheat, potatoes and barley. The oat crop in Quebec is by far the most important one in the province, there being 1,574,100 acres devoted to it in 1909. The variety with which special work is being done most largely is the Banner. This variety continues to prove its superiority for the greater part of the province. Other varieties might be more suitable for certain conditions, but this is a matter which can only be settled by actual test on the part of the individual farmer.

Very little special work is being done by the association with spring wheat. The varieties grown most at present are Red Fife and White Fife, although certain softer but higher yielding sorts, such as the Campbell's White Chaff and White Russian, are grown to some extent.

The area devoted to potato growing in the province is second only to that under oats, while the yield per acre realized is greater than that obtained in any other province in Canada, with the exception of Saskatchewan. In quality Quebec potatoes occupy a high place, but on account of the number of different varieties grown in any given locality, the inducement to buyers is not so great as it is in the maritime provinces, where potatoes of one variety may be purchased in large quantities in certain centres. Very little interest is being taken in the improvement of the potato, and it is to be hoped that many will take up systematic work in the near future. Better and fewer varieties should be used and greater care should be given the selection of seed tubers. Lack of uniformity in type is a prevailing defect and one which can easily be overcome by the exercise of greater care in the choice of seed.

The climatic conditions during the past season were generally favourable, although the spring was late and in some sections the summer dry. The harvest was wet in many districts, resulting in considerable damage to the cut grain, some seed germinating in the stook.



## IN THE MARITIME DISTRICT.

In the maritime provinces the work of the association continues to advance, although the growth is not rapid. The majority of the members are doing excellent work.

The crops receiving the greatest attention by our members are oats, wheat, barley and potatoes, in the order named.

The oat crop in the maritime provinces is an important one. According to latest estimates the yield of oats in the three provinces during the past season was 17,338,000 bushels. The average yield per acre is placed at 34.2 bushels in Prince Edward Island, 31.51 bushels in Nova Scotia, and 32.3 bushels in New Brunswick. These yields are not what they might be were better seed used. We have at present only between 20 and 30 members doing work in the systematic improvement of oats in these provinces while there should be as many hundreds. Our most immediate need as an association is for a greater number who will produce registered seed in quantity—say from 300 to 500 bushels each.

At the present time we have several varieties of oats represented, although the Banner still holds first place. Black varieties are grown here to a greater extent than in any other part of Canada.

Wheat growing in the maritime provinces is a matter of local concern largely, but it is of sufficient importance to warrant some attention being given to seed selection. Statistics indicate that approximately 1,300,000 bushels of wheat were produced by the three provinces during the past season. The average yield per acre is given as 20.2 bushels in Nova Scotia, 19.5 bushels in New Brunswick, and 19.4 bushels in Prince Edward Island. The smaller yield in Prince Edward Island is doubtless due to a considerable extent to the ravages of the joint worm which continues to be troublesome in that province.

In Prince Edward Island White Russian holds first place among our members, while Red and White Fife are grown most largely in Nova Scotia and New Brunswick.

Barley does not occupy a prominent place at present on the farms of the maritime provinces, although the results obtained by some of our growers indicate that it can be grown successfully. Barley as a stock food is very valuable and is worthy of more attention in this part of Canada.

The average yield per acre for the three provinces during the past season is given as 27.7 bushels, Prince Edward Island taking first place. The only varieties under special consideration are Mensury and Mandscheuri.

In the maritime provinces the potato crop occupies a high place commercially. Estimates for the past season place the yield for the three provinces at approximately 28,000,000 bushels which is nearly double the combined yield of wheat, oats and barley. The average yields per acre are given as 209 bushels in New Brunswick, 207.25 bushels in Nova Scotia, and 198.88 bushels in Prince Edward Island.

The varieties under consideration by our members are mostly of the Green Mountain, Carman and Early Harvest type. In Nova Scotia and New Brunswick the Green Mountain variety claims first place, while in Prince Edward Island the Early Harvest is gaining ground rapidly chiefly on account of its ability to resist disease to a greater extent.

Last year 569,900 acres were utilized to produce the eight leading grain crops grown in these provinces. This acreage required approximately 1,200,000 bushels of seed. The average yields per acre realized were as follows: Spring wheat, 15.6 bushels; oats, 26.4; and barley, 22.7 bushels. These figures plainly indicate that the full producing power of the average farm has not yet been reached. The use of better seed is one very important consideration in seeking to increase these yields. The supply of really high-class seed is not what it should be, and until that supply is forthcoming we cannot hope to see any great improvement.

In the maritime provinces the past season has favoured some of our growers and caused damage to the crops of others so that all cannot show an equal standing. The seeding was late and the summer dry in most districts, so that the crops did not mature until late. The heavy fall rains promoted the serious development of rot among potatoes throughout the provinces, some of our growers reporting a large per cent of the tubers spoiled.

## WORK BEING DONE WITH THE DIFFERENT FARM CROPS.

### WHEAT, OATS AND BARLEY.

The attempts which are being made by our members to develop strains of wheat, oats and barley which excel in yield, quality and uniformity under the various conditions in which they are grown are proving successful. From a purely scientific standpoint, the method of selection in use by the association with these crops doubtless has its limitations. It is probably slower and surrounded with greater uncertainties than are associated with the system known popularly as the De Vriesian system. This latter system recognizes the individuality of plants and aims to discover the best individuals by testing for two or three years the progeny of a number of those which appear most promising, and finally eliminating different groups until only one remains. The principle involved in this system has been generally accepted by the association on the authority of those who are considered competent to pass upon it, as being the safest and quickest of any system of improvement known at present, but on account of the time, care and training necessary to carry it out to advantage it has not been thought well to recommend it for the use of the average farmer. The system now in use, despite its limitations, is accomplishing a great deal by way of increasing the yield and improving the quality and uniformity of the crops in general.

The conditions peculiar to any one farm are likely to effect a certain and continuous influence over an ordinary variety until a proportion of the plants find difficulty in keeping up in the race. This is especially true where little care is given the choice of seed and where the fanning mill is not used with sufficient thoroughness. Even where this attention is given it is difficult to remove the progenitor of weaklings in any way other than by considering the entire plant. Were it possible for new beginners to secure as foundation stock seed originating from a single mother plant of outstanding merit, or seed which has been continuously selected according to our own present system for a number of years it is not likely that the continuous selection of heads from standing plants from such stock would effect much if any actual improvement in yield. In these cases it would seem advisable to modify the regulations somewhat so as to encourage a greater number to take up the work. In any case, however, there should still be required some sort of hand selection, while the *threshing* of such selections by hand or by a special machine considered to be equal to hand threshing should be insisted on.

During the past year samples of seed, which were originated from single mother plants, under the direct supervision of Dr. C. E. Saunders, Experimental Farm, Ottawa, were sent to four different growers, as follows:—Two samples of Marquis of 5 lbs. each, one lot of 5 lbs. of Red Fife H, and one lot of 10 lbs of Stanley A. It is to be hoped that Dr. Saunders and other breeders will be able to provide us with large quantities of seed of this sort for propagation and distribution in the near future.

The very excellent work which is being conducted at the Agricultural College, Guelph, Ont., by Prof. Zavitz and his able staff in the moulding of more useful plants has probably done more than anything else to stir up an interest among the farmers of western Ontario in the matter of crop improvement. The work of the Experimental Union, under Prof. Zavitz's direction, has also been far reaching in its effects



and has been the means of inducing many experimenters to affiliate themselves with our association in order that they might receive further assistance in propagating to best advantage the seed which they have introduced. In Fig IX is shown a photograph of a part of the experimental and breeding grounds at the above station.

The ideals set up by the majority of our growers seem to be of a fairly high order, although some have a wrong idea as to what constitutes the best type of plant and head. Some few growers of wheat, for instance, have been selecting for too large and open a head with the result that little real progress is being made in these cases. Long open heads are likely to be associated with poor quality and are often produced near the margins of the plot or under conditions characterized by a superabundance of food, moisture or light. Since such heads are the direct result of external and unstable conditions the acquired characters are not likely to be transmitted even though they were desirable. More compact heads chosen from strong, vigorous plants which produce the maximum number of good heads are preferred. The best yielding plants do not always produce the largest heads, but rather heads that are compact and well filled with good tips.

In fig. XI is shown a number of typical heads of leading varieties of wheat. Note the compactness of the heads of Red Fife as compared with those of the White Russian. The latter variety, though of inferior quality, is grown for home consumption in eastern Canada where it is well liked on account of its hardness. In western Canada, however, it is not wanted, as the Red Fife and other harder varieties are better able to meet the demands of a critical export trade.

The interest in better seed oats in Canada has increased greatly during the year and there has been a substantial addition to our list of oat growers. Oats grown under our supervision have proven exceptionally satisfactory wherever used. The following letter from C. J. Turnbull, Winnipeg, Man., is a good representative of many received:—

‘The writer has just received returns of threshing on his farm in Saskatchewan. Crop from registered Banner oats, about 45 acres, yielding over 4,100 bushels; 6 acres Garton’s Regenerated Abundance, 505 bushels; 40 acres S. B.’s Orloff, over 3,600 bushels; and the Red Fife wheat from registered seed went about 40 bushels to the acre. We are gratified. The results have a two-fold meaning. First—good money; second—comparative tests for one year of the different varieties, the ground having been identical both in character and manner of working, broken by the steam ploughs in 1908 at the rate of about 20 acres per day, so that the whole thing was broken in a few days, and the land could not possibly vary in condition on that account. It was all open prairie soil, identical in every respect.’

Three years ago registered Banner oats from Ontario were purchased by the Aberdeen and North of Scotland College of Agriculture for experimental purposes. In a recent report from that institution many favourable comments are made re the value of Canadian Banner. The following striking quotations are especially noteworthy:—

‘It is interesting to note how the average in favour of Banner remains fairly constant from year to year during the past five years.’ ‘A comparison of the light Canadian Banner seed at Westfield and Longmorn against heavy home grown Banner is all in favour of the “true” seed from Canada’; and ‘The pedigree Banner seed used in 1908, hand selected from the growing crop and guaranteed true to type, is striking evidence of the importance of “true” seed.’ These are fine evidences of the value of selection and prove that improvement as effected by our methods is not a mere transitory acquirement which is likely to be lost immediately the seed is removed from where it has been grown.

#### WORK WITH CORN.

The propaganda making for the improvement of corn in Canada which first took definite shape in so far as our association is concerned five years ago, has received an

unusual impetus during the past season. This has come as a result of the active interest taken in the work by the Ontario provincial government, the greater part of the work of corn improvement being confined to this province.

To Mr. McKenney, agricultural representative for Essex county, is due in no small measure the credit of this revival of interest in the growing of better corn in south-western Ontario. The three days' corn show at Essex, organized and carried out to so successful a termination by him last February (1909), marked the beginning of a new interest in this great crop, the importance of which it is impossible to estimate.

At the close of this show there was organized an association known as the Ontario Corn Growers' Association, the main purpose of which is to encourage a continued interest in the matter of seed corn generally. We believe that this association will do much by way of interesting the rank and file in better seed and in encouraging many of the best growers to affiliate themselves with our association and thus reap the advantages of expert supervision over actual breeding operations and also of having their commercial stocks more widely recognized.

Following this new impetus the Agricultural Societies Branch of the provincial department offered further encouragement through its standing crop competitions which were taken advantage of by a substantial number of growers.

The magnificent exhibition of corn by members of the Ontario Corn Growers' Association at Essex last week (February 2-5, 1910), together with the remarkable interest that was taken in the classes and addresses on corn and corn growing indicated clearly that the growers are thoroughly aroused on the question of good seed.

The greater part of the special work which the association has in hand in the improvement of corn is confined to the counties of Essex, Kent and Elgin where this crop is grown most largely for the grain. This district constitutes the main source of Canadian grown seed corn, especially of the Dent varieties. The counties of Essex and Kent alone produce more than half of the husked corn of the whole province. It is from these counties, therefore, that the great bulk of the seed corn must come.

Among the varieties of Dent corn operated with by our members in Ontario the White Cap Yellow Dent, Reid's Yellow Dent and Leaming continue to be the most popular. Our present type of Reid's does exceedingly well in certain restricted areas in Essex county and will doubtless grow in popularity as it becomes adapted to the country. It has already shown itself capable of responding readily to selection, although the ideals set up by some of the growers have not always been along the right lines. For instance, one grower has been selecting for too large an ear, the prevailing number of rows of kernels found being 22. Such an ear requires too long to mature and is borne too high on the stalk as is usually the case with large late ears. Fig. XII shows a stalk of this variety bearing the ear 6 feet 8 inches from the ground.

In addition to selecting for large ears certain growers select with a view to developing two ears to the stalk with the result that this year, in one case, 27 per cent of the stalks produced on the special plot were found to be producing two ears, although these were not of a highly desirable type. In seeking to increase the yield in this way these growers have been gradually developing a type which is too late to mature perfectly every year in any part of the province, except possibly in some very isolated sections of south Essex. Another grower, who understands the situation better, has discarded for seed purposes, ears having more than 18 rows of kernels and has passed by stalks having a tendency to produce more than one ear, with the result that an earlier and more reliable strain is gradually being developed. This year only 14 per cent of the stalks on the hand-selected seed plot of this grower showed a tendency to produce more than one ear. Breeders of Dent varieties should aim to develop strains which will produce one good ear on every stalk every year, in so far as conditions of soil and season will permit.

The variation in yield between the different rows on the special corn plots continues to be of more or less moment. Even in the plots of some of our best growers who have been operating for a number of years there is still considerable variation, showing that selection has by no means reached its limit. Fig. XIV shows extreme



variation in one of these plots, both in total yield and in yield of nubbins. It will be noticed that row nine produced the greatest yield, viz., 337 lbs., while row eleven with only 108 pounds, took lowest place. Many other instances of similar significance are on record.

In all the counties in Ontario, except Essex and Kent, the Flint varieties predominate where grown for grain. Even as far south as Elgin county, these varieties are popular on account of their reliability. The most popular varieties operated with at present are Compton's Early, Longfellow, North Dakota and King Phillip.

In sweet corn Stowell's Evergreen, late and early strains, and Early Crosby are practically the only varieties under special consideration at the present time. Stowell's Evergreen is becoming quite popular as a soiling crop in certain southwestern counties, and some excellent work is being done by certain growers in producing seed of a high standard for this purpose. Fig. XVI shows the variation in yield of nubbins and barren plants per row on a plot of Early Crosby grown in Norfolk county, Ont., and indicates the possibilities for improvement here as in the larger field varieties.

The quality of fodder in corn is a matter worthy of careful consideration, and is one which has been studied with care. While growers in those sections which produce corn chiefly for grain may be disposed to overlook the value of fodder, other growers who are growing the crop for ensilage—and these constitute the great majority—are likely to go to the other extreme and attach greater importance to the character of the leaf and stalk.

An ideal ensilage variety is one in which the ear is sufficiently early to reach the firm dough stage before the time the first injurious frost usually occurs in the section where it is to be grown, together with a stalk which is not too coarse and heavy but of sufficient strength to bear a good ear and a goodly supply of leaves without breaking. In Fig. XVII is shown a plot of Mastoden corn grown near Meaford, Ont., on Georgian Bay. While a magnificent foliage will be observed, yet the ears produced were still in the milk stage when danger of frost necessitated the cutting of the crop. An earlier variety with a greater proportion of grain to fodder would have produced more food value to the acre in this district.

In addition to inspecting and studying the majority of the special corn plots of members of the association, during the past season, it was the writer's privilege to examine and judge 58 fields of corn entered in the standing crop competitions conducted by the agricultural societies branch of the provincial Department of Agriculture in Essex and Kent counties. A word regarding some of the more suggestive observations should be of general interest here as indicating the general condition of the corn growing industry of this part of the province.

The wet spring operated seriously, in many cases delaying planting from two weeks to a month. The result was that a good deal of corn did not mature, while the proportion of small ears and nubbins was unusually large. While corn grown on tile-drained land suffered much less, as a rule, than did that on land not enjoying this protection, yet even here the crop was, in many cases, not up to what it would have been in a normal year.

Other defects were found which the grower has in his power to correct, and it is of these I wish to speak more particularly. I refer to the lack of purity and the lack of uniformity in type.

Regarding purity of variety, it is presumably safe to say that the majority of the growers visited are aware that corn cannot, as a rule, be grown safely within 80 rods of fields of other varieties and remain pure, unless the dates of planting, or of maturity, in the kinds concerned differ by at least two weeks. Many instances were noted where every precaution was taken to have the fields isolated, although oftentimes these efforts were frustrated by neighbours growing different varieties in adjoining fields.

On the other hand, in many cases, impurity of variety is not regarded as a serious menace to the profitable growing of corn. In fact, several instances were found where varieties had been mixed intentionally, with the idea that the desirable characters of each kind would blend and produce a crop of enhanced value. This is a precarious

practice. It may sometimes happen that a better yield is secured in this way, but it is much safer to use a pure variety of the type desired. In the latter case there is a much greater likelihood of the crop maturing uniformly, and of producing a more uniform growth throughout, with the ears borne at a more uniform distance from the ground, thus conducing to ease in harvesting where the machine is used. It is a very uncertain and unsafe practice to use seed from a crop of mixed corn where the parentage is so obscure and variable.

Regarding uniformity of type, it was found that in the majority of fields there was a great multiplicity of types, thus indicating that the matter of 'choice of seed' has not always received the attention that it deserves. As an instance of this, an examination of a field of Yellow Dent revealed a large proportion of ears to be of the late Leaming type, while a very considerable proportion closely approached the earlier Pride of the North type. As would naturally be expected, there was a very conspicuous lack of uniformity in maturity throughout the whole field. In the many fields of White Cap Yellow Dent examined, a great diversity of types was also found; ears varying from the long thin to the short thick type, and dent varying in character from the strongly-pinchd to the more smoothly-dimpld. (See Fig. XIX.) Since character of dent, depth of kernel and length of time required by corn to reach maturity are closely co-related, naturally the uniformity of maturity of the ears was found wanting. Occasionally a field of remarkable purity and uniformity was found, showing that these qualities are quite obtainable, even in ordinary field practice.

In the White Cap variety there were found many ears with white cobs and many with red, although the majority of the fields bore white cobs almost exclusively. It seems to be the opinion of most authorities that the true White Cap should have a white cob. Some growers are of the opinion that the red cob produces a larger yield, and have selected for seed only ears with a cob of this colour, until they have developed what might be termed 'red cob' strains. The important consideration here is that selection should be made either for one or for the other, so as to provide against a mixture of types and its attendant evils.

The percentage of barren plants was not found to be large, although, as has already been pointed out, the proportion of nubbin-producing stalks was unusually high. The tendency to select very large ears for seed happily does not obtain to a great extent, judging from the character of the ears produced last year. Fields in which the average length of ear did not exceed  $9\frac{1}{2}$  to 10 inches, with a circumference of about 7 inches, were found to produce the largest proportion of good ears, with a larger estimated yield per acre.

Advantage was taken of the opportunity to make a close study of the quality and quantity of fodder produced by the different types. The Yellow Dent varieties proved to have the larger number of leaves, the internodes being shorter with leaves borne closer to the tassel. The stalk was also considered to be of rather better quality for fodder than is that of the White Cap. The latter variety, however, is very popular on account of its earliness and its usually large proportion of good ears. When improved along certain lines, notably in uniformity of type, it will occupy a high place among the best varieties, especially for northern districts where good ensilage varieties are desired.

The advantages of the special seed-corn plot as a medium through which high class types may be built up and maintained in purity have been repeatedly demonstrated, with the result that a very considerable number of growers have applied for membership in the Canadian Seed Growers' Association, with a view to carrying on this work systematically under expert direction.

In Manitoba considerable interest is also being evinced in the growing of fodder corn, although the practicability of producing reliable seed is somewhat doubtful.



## WORK WITH POTATOES.

The systematic selection of seed potatoes as a means of improving the yield and quality of this important crop is growing in popularity and several promising growers have associated themselves with the association during the year. There is abundant evidence to show that the potato responds readily to selection and quickly repays the grower for any extra attention he may give it.

On account of the comparatively large amount of seed required there is always a strong disposition to use tubers for seed which are not wanted either by the housewife or by the trade. The degree to which this tendency becomes operative determines to no small extent the fate of a variety. Indeed it may be said that many of our once best varieties owe their disappearance to the continued using of undesirable tubers for seed.

The careful choice of seed tubers seems necessary to prevent the deterioration of our best stocks. A little extra work along definite lines is capable not only of maintaining the strain but of improving it considerably. A few bushels extra yield obtained through the operating of a special plot is well worth the grower's while. In many cases this extra yield per acre has been as much as 15 or 20 bushels, which is sufficient to plant an acre the following year.

The demand for a better class of seed tubers continues to increase, although few growers seem disposed to try to supply it. This is doubtless due to the space and labour required to carry through the winter a sufficient quantity to make it worth while. Our association has a number of promising pioneers in this work and it is to be hoped that their success and example will stimulate others to do something along this line.

## EXHIBITIONS OF SELECTED SEED AND DISTRICT MEETINGS.

During the year district exhibitions and meetings have been held as follows: At Amherst, N.S., for the maritime district in December; at Guelph, Ontario, for the province of Ontario in December; at Regina, Sask., for the province of Saskatchewan in January, 1910. An exhibition was arranged for the province of Quebec to be held on January 31, 1910, but practically no exhibits were sent and it would appear that some means other than those heretofore employed must be adopted if this exhibition is to fulfil the object for which it was intended. The exhibition and annual meeting for the province of Manitoba will be held at Brandon on March 5 to 11 of the present year.

The money paid out in prizes at these exhibitions is indicated in the treasurer's report.

An educational exhibit was also put at Toronto and Ottawa exhibitions last fall and created a good deal of interest in the work.

## COMPETITION BY BOYS AND GIRLS.

In addition to the prizes offered at our regular exhibitions, premiums were offered in the maritime district, Quebec and Manitoba for special selections of plants and seed by boys and girls. In addition to the cash prizes offered by the association, our president, Dr. Robertson, generously offered a gold medal to the boy or girl having the most creditable exhibit of white oats in the maritime district and in Quebec, and Red Fife wheat in the west. A photo showing front and back views of this handsome medal is shown in Fig. XXIII.

## MARITIME EXHIBITION OF SELECTED SEED.

*(Amherst, December, 1909.)*

The exhibit of seed and plants selected by our maritime members from the crop of 1909, and placed at Amherst in December, was larger than ever before, there being 23 exhibitors and 42 exhibits. Mr. E. D. Eddy, Ottawa, judged the exhibits and kindly submitted the following observations on the showing made:—

'The seed exhibit occupied a much more prominent position than formerly at the maritime winter fair this year. The fair building has been enlarged considerably and greater space provided for the seed department, so that more provision was made for a display. The number of entries in the general classes was larger than ever before, and the quality much above the average. The Canadian Seed Growers' exhibit was particularly good and was a credit to the work of the association.

'This exhibit is valuable in advertising the work of the association, as it is brought prominently before the public and much educational work is thereby accomplished. The value of the Canadian Seed Growers' system of selection was clearly evidenced in the exhibits this year. The selected seed was much superior to that in the general classes in regard to freedom from weed seeds, foreign grains and other impurities, as well as in trueness to type and variety.

'The trophy awarded to the best exhibit of seed in the Canadian Seed Growers' Association and general classes was won this year by Mr. Donald Innes, one of the pioneers of the association. This is the third time in succession that Mr. Innes has won the cup, so it now becomes his property.'

In the competition by boys and girls all the prizes offered were won. The medal for the best exhibit of white oats was won by Miss Pearl Patterson, Sussex, N.B. This competition created considerable interest and we would recommend that it be continued.

## ANNUAL MEETING OF MEMBERS OF THE ASSOCIATION IN THE MARITIME DISTRICT.

*(Amherst, December 7, 1909.)*

The fifth annual meeting of members of the Canadian Seed Growers' Association resident in the maritime district was held in the lecture room of the Maritime Winter Fair building on the afternoon of December 7. Mr. Donald Innes, chairman of the Seed Committee, occupied the chair.

Rev. T. Hunter Boyd, Waweig, N.B., was elected to act as secretary *pro tem*, and reported the proceedings as follows:—

The chairman called on Mr. S. J. Moore to explain the arrangement whereby an opportunity was now afforded the members of the association in the maritime district to discuss the work of the association in their district and to submit any recommendations they might see fit.

The secretary-treasurer, Mr. L. H. Newman, Ottawa, then submitted a report on the work of the association in the maritime provinces. This report was received and adopted.

Mr. Ira L. Rodd, North Milton, P.E.I., read a paper on 'The Importance of Choosing Suitable Varieties as Foundation Stock.' He showed that success with a reputed good variety was not uniform as to locality and pointed out the necessity of testing different varieties in order to secure good foundation stock.

Mr. Robert McKay, Millsville, N.S., was unable to be present to read his paper on account of illness and Mr. Newman was called on to give a brief summary of Mr. McKay's observations during several years of seed selection.

Mr. Marchbank, New Annan, P.E.I., gave a paper on 'Some Results Obtained through Seed Selection.' Attention at the outset was devoted to the absolute neces-



sity of good cultivation, and the value of treating the seed with formalin for smut was emphasized. The value of careful selection and cleaning was illustrated from experience.

Mr. Creed, Albion, P.E.I., was not present to read his paper on 'Does it Pay the Farmer to Operate a Special Seed Plot,' but the secretary advised that this paper would probably be received later when it would be published in the annual report.

The chairman then introduced Mr. E. D. Eddy, of the Seed Department, Ottawa, who gave an address on the 'Value of a Seed Plot in Creating and Maintaining High Standards in Crop Production.' Considerable discussion followed the presentation of this paper.

Mr. S. J. Moore, Truro, N.S., gave an address on 'The Outlook for High Class Seed in the Maritime Provinces.' After discussing conditions of the trade in small seeds, the question of seed grain was taken up. It was pointed out that the quality and quantity of the seed exhibited at this fair has been steadily improving. The interest in good seed grain was further evidenced through the fact that field competitions are now being held in all provinces. These competitions had clearly demonstrated that the best seed grain for the maritime provinces was that produced by members of the association.

Mr. W. W. Hubbard, of the New Brunswick Department of Agriculture, who was invited to speak, testified as to the work of the Northumberland Agricultural Society in conducting a field competition, and stated that the Department of Agriculture would encourage all societies in the province to take up the work.

Mr. Moore advised that the Seed Commissioner was favourably impressed with the possibility of growing seed of field roots and vegetables here and that it was possible an expert would ultimately oversee the efforts in this direction.

Meeting was then adjourned by the chairman.

Respectfully submitted,

(Signed) T. HUNTER BOYD.

The above papers are printed in full on page 88 of this report.

#### ONTARIO EXHIBITION.

The exhibition of seed and plants selected by our Ontario members in 1909 was held as usual in connection with the Seed Department of the Ontario Provincial Winter Fair at Guelph in December. The exhibits by members of the Canadian Seed Growers' Association were judged by Mr. Jno. Buchanan, of the O.A.C., Guelph. Mr. Buchanan has kindly submitted the following statement *re* the showing made by the various exhibits:—

'This year the seed exhibit was given a more prominent location, with much more space for spectators. The result was that greater interest was evinced in this department than in previous years. The show of small cereals, peas and beans was good. In the corn section there was abundant evidence that the exhibitors are quickly becoming educated to the requirements of first-class seed corn, and the display on the whole was excellent, excepting that much of the corn was slightly loose on the ear, showing that it had not been thoroughly matured before harvesting. This, no doubt, was due to the unsatisfactory season for corn.

In the potato section, there is still a tendency to place on exhibit the largest tubers obtainable. This tendency, I am glad to say, is gradually growing less pronounced and should be regularly discouraged, since abnormally large potatoes are not desired by any consumer, nor have they the quality of the ordinary sized tubers. On the whole, there was a very good showing of potatoes.

While it is true that the seed section of the Provincial Winter Fair is gradually developing and improving, one can scarcely help comparing the seed section with the

poultry section and wondering what an outside visitor would conclude regarding the relative value and importance of the farm crops of Ontario and the poultry of Ontario, if he based his judgment entirely on what he saw at the Winter Fair.'

In the Canadian Seed Growers' Association class there were 54 exhibits brought out by 28 exhibitors, while in the open class there were 159 exhibits by 63 exhibitors.

#### *Winners of Special Prizes.*

1. The 'Klinck' trophy for the best 25 ears Dent corn, any variety, grown in Ontario in 1909, according to the rules of the Canadian Seed Growers' Association, was won by Mr. G. W. Coatsworth & Son, Kingsville, Ont., with an excellent sample of Reid's Yellow Dent. (See Fig. XXIV.)

2. The 'Bâte cup' for the best 25 ears of Flint corn, any variety, grown in Ontario in 1909, according to the rules of the Canadian Seed Growers' Association, was won by Mr. Jas. Fletcher, Valetta, Ont., with an exceptionally fine sample of Comp-ton's Early. (See Fig. XXV.)

3. The 'Hodson trophy,' given for the member making the most creditable showing of selected seed for the whole exhibition, was won by Mr. Jas. Fletcher, Valetta, Ont.

#### ANNUAL MEETING OF MEMBERS OF THE ASSOCIATION IN ONTARIO.

*(December 9, 1909.)*

In accordance with the intimation of last year a special meeting for the benefit of the members of the association resident in Ontario was held at Guelph during winter fair week on the afternoon of December 9. Prof. C. A. Zavitz, first vice-president of the association, occupied the chair and took occasion to explain the action of the directors at the last annual meeting at Ottawa, in regard to the holding of these district or provincial meetings throughout Canada. The plan of holding a business session at the beginning of these meetings so that every member might have an opportunity to express his opinion and make any recommendation he might see fit was referred to. The programmes for these meetings are arranged to facilitate the carrying into effect of the above arrangement, and those present were encouraged to express themselves freely on all matters pertaining to the work the association has in hand or may undertake.

After this introduction, the secretary of the association was asked to present a report on the work of the association in the province. The substance of this report is published elsewhere so shall not be repeated here.

The following papers were next presented in order:—

'Corn Breeding on the Farm.' Mr. L. D. Hankinson, Grovesend, Ont.

'Some Results Obtained in the Improvement of the Potato.' Mr. Alfred Hutchinson, Mount Forest, Ont.

Discussion led by Mr. John Clark, Cainsville, Ont.

'The Choice of Foundation Stock and its Importance.' Mr. Chester Nicholson, Mount Forest, Ont.

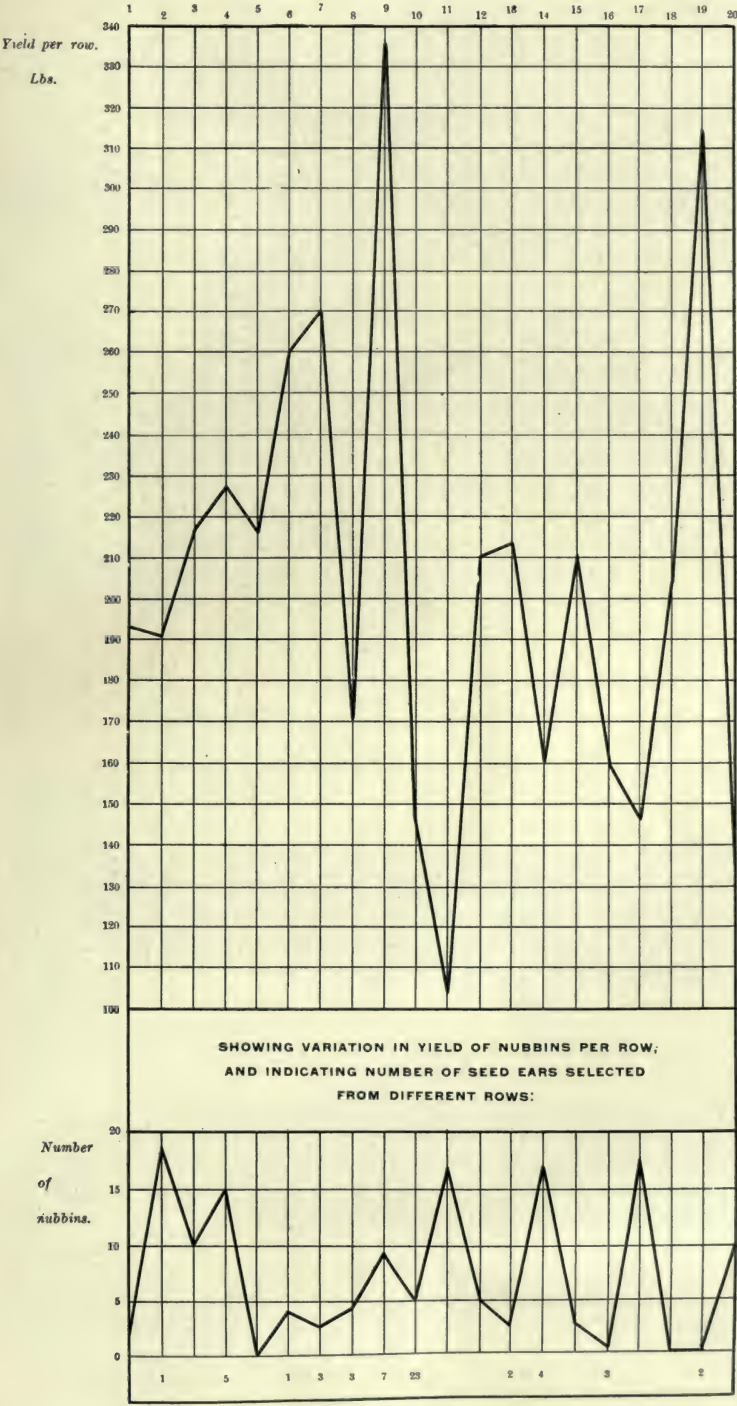
Following the presentation of this paper, Mr. T. G. Raynor, Seed Branch, Ottawa, spoke on 'The Scope for the Production of Improved Seed in Ontario.'

Mr. J. C. Coté, representative of the Seed Branch for the province of Quebec, led in the discussion on this address and took occasion to compliment the Ontario members of the association on the apparent grasp they have of the principles of seed production and crop improvement. He believes there will always be a demand in Quebec for Ontario grown seed despite the fact that he is trying to encourage a greater recognition of home grown seed in his native province.

'Quebec farmers,' continued the speaker, 'will always buy the great bulk of their seed corn and clover from Ontario and they are anxious to secure the very best quality you can offer. Corn growing in Quebec is becoming more popular, and as a result a very considerable quantity of seed corn will be required in the very near future.'

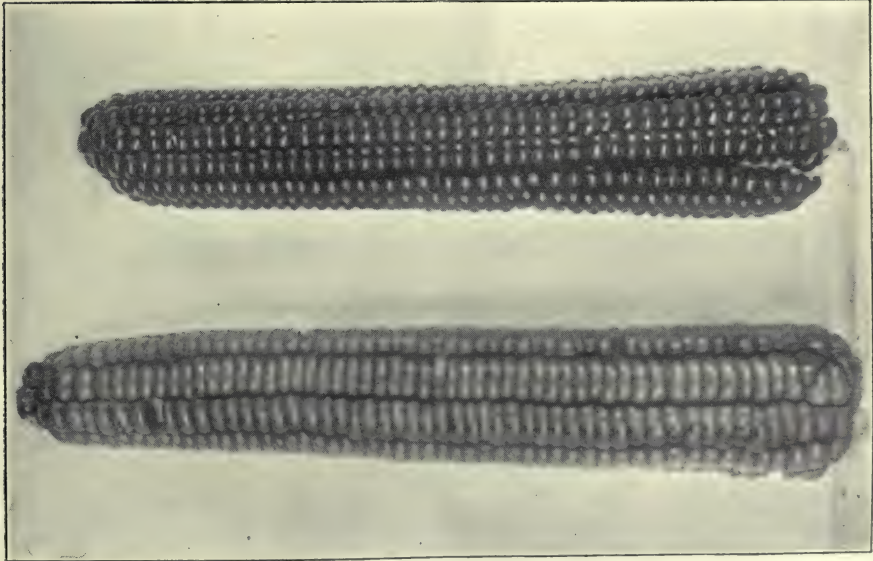


DIAGRAMS SHOWING VARIATION IN YIELD OF INDIVIDUAL ROWS OF  
CORN GROWN ON SPECIAL SEED PLOT IN 1909: (VAR. REID'S Y. DENT.









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FIG. XV—No. 1. A good type of North Dakota White Flint. Note broad full kernels.  
 No. 2. Hybrid, 12-rowed, red ; cross between King Philip and Compton's Early.  
 No. 3. A very early 8-rowed White Flint, grown in Nova Scotia.  
 No. 4. Gehu, a 12-rowed Yellow Flint, grown in Manitoba.





# EARLY CROSBY SWEET CORN.

DIAGRAMS SHOWING PER CENT NUBBINS AND PER CENT BARREN

PLANTS PRODUCED ON EACH ROW OF A SPECIAL SEED CORN

PLOT GROWN NEAR ROUND PLAINS, ONT.

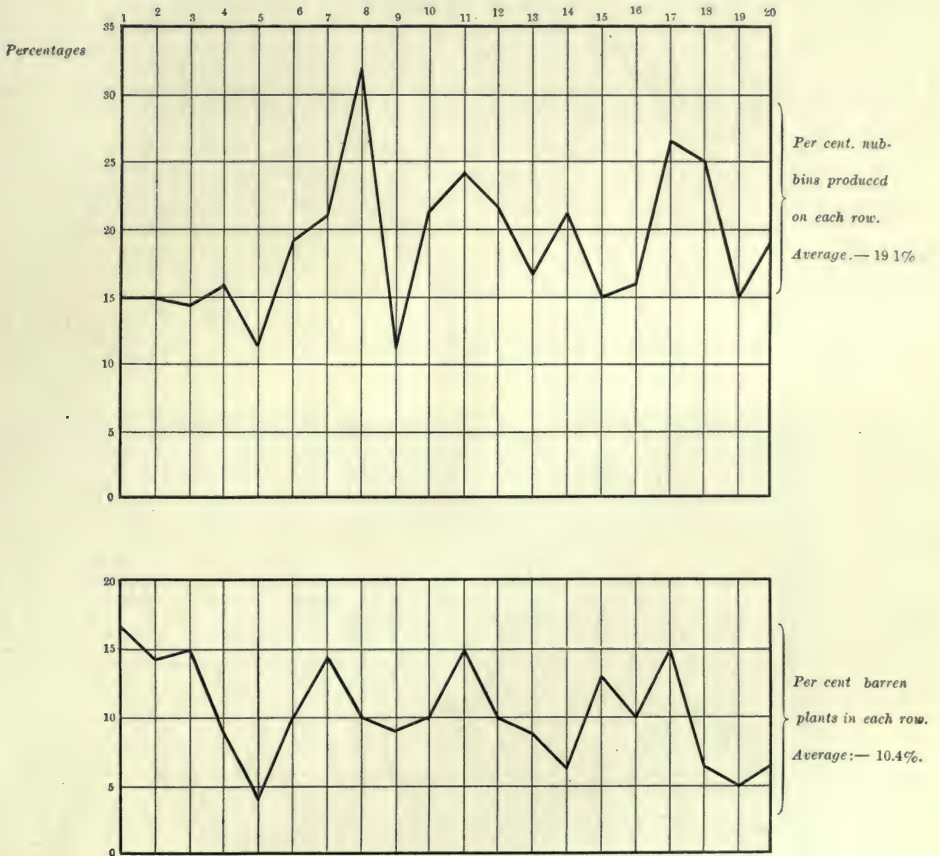


FIG. XVI.







FIG. xvii.—Mastoden corn 12' 6" high, grown in lat. 45° (near Meaford, Ont.) Too late a variety to make even good ensilage in this district.



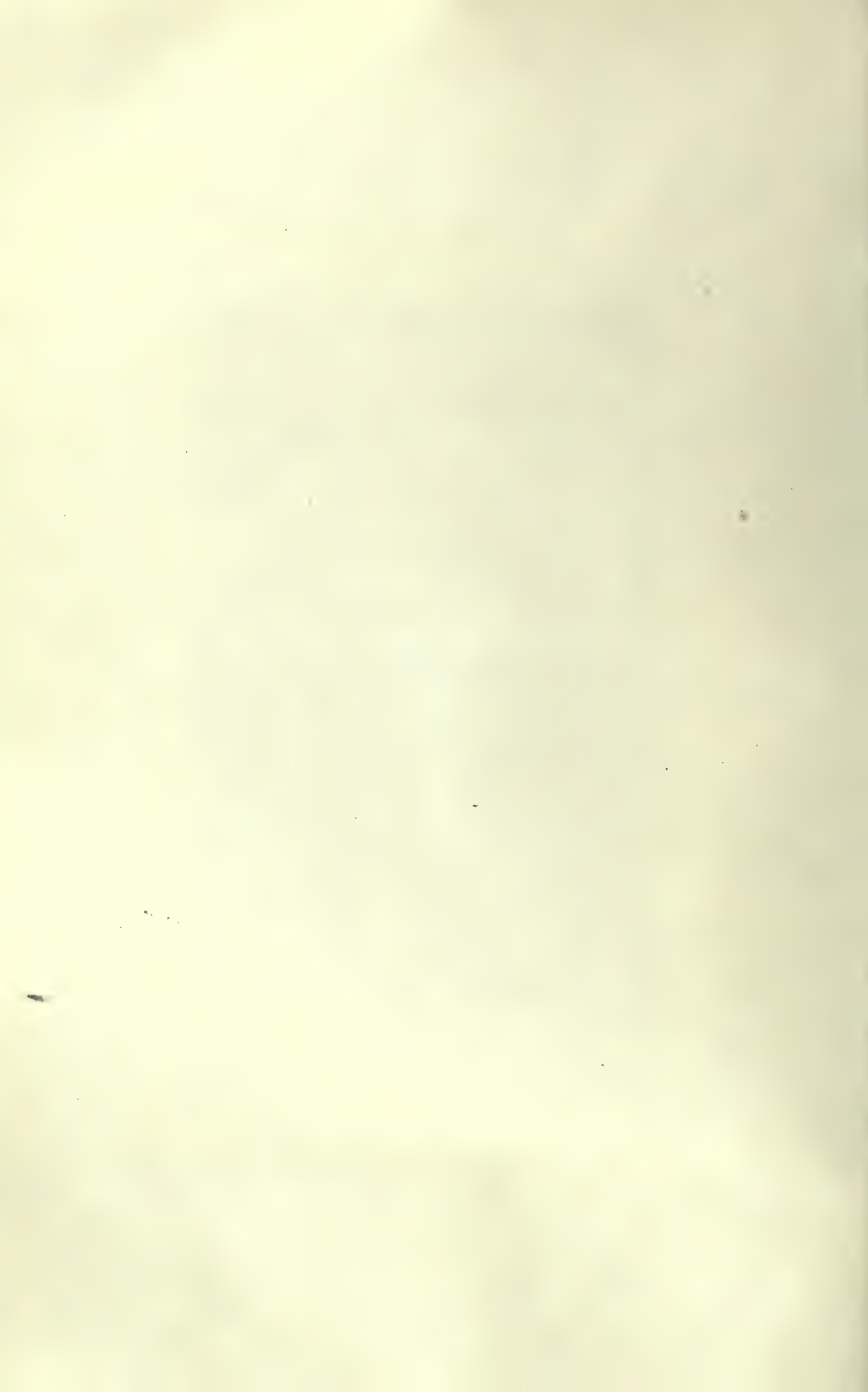
FIG. xviii.—Ears of Mastoden corn (almost half natural size).  
No. 1 An average mature ear as grown in S. W. Ontario.  
No. 2 A representative ear taken at cutting time from a crop grown for ensilage in the Ottawa district, and thoroughly dried. Over 70 p.c. of the weight of the ear when pulled was water. Note the light chaffy character of the kernels of the dried ear.







FIG. XIX--Ears of White Cap Yellow Dent from same field.  
Ear on left, smooth with shallow kernel. Germination 100 p.c.  
Ear on right, rough with deep kernel. Owing to late season this ear did not mature properly, retaining too much moisture. Germination only 50 p.c.





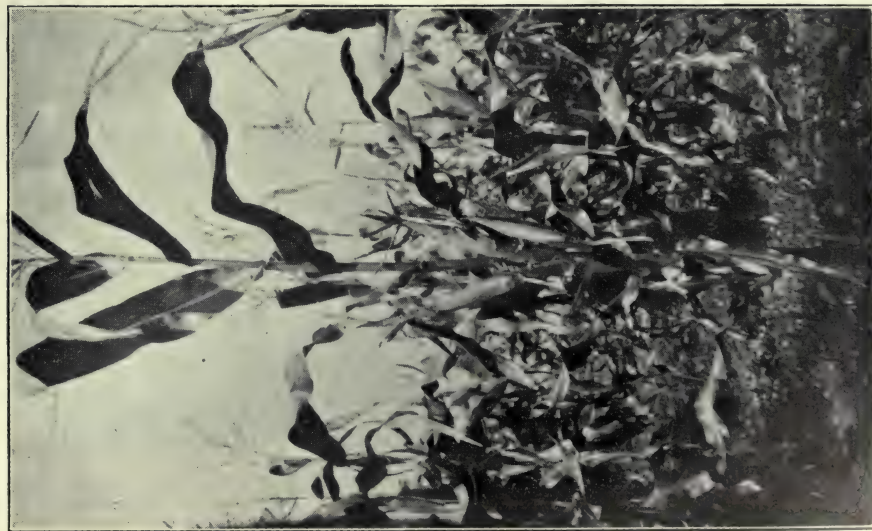


FIG. XX—Single stock of Stowell's Evergreen sweet corn (late strain) bearing three ears. This is not a desirable character.



FIG. XXI—Hill of Compton's Early corn (12-rowed yellow flint) showing one good ear to a stalk.







A good hill showing one ear to a stalk.  
FIG. XXII—Longfellow corn (8-rowed yellow flint). Showing heavy suckering peculiar to this variety.







FIG. XXIII--Front and back views of Gold Medals awarded in the competitions by boys and girls in the Quebec and Maritime districts in 1909, by Dr. Jas. W. Robertson, Ottawa, Ont.



Mr. John Hunter, Wyoming, gave a short talk on 'The Importance of Systematic Work in the Securing of Farm Seeds,' giving some of his experience in crop growing during the past 30 years. The main advice Mr. Hunter wished to offer was, tile your land, plant early, fan your seed, and select carefully and systematically from desirable plants.

Mr. Robert McKay, Maxville, Ont., who was unable to be present, sent a paper entitled 'Nine Years' Experience in the Selection of Spring Wheat in Glengarry County, Ont.' A summary of this paper was presented by the secretary.

At the evening session, Mr. J. H. Grisdale of the Experimental Farm, Ottawa, gave an excellent address on 'Best Types of Ensilage Corn for the Various Stock Raising Districts of Ontario.'

(A full report of this address will be found in the Report of the Live Stock Association of Ontario for 1909.)

Mr. A. McKenney, secretary Ontario Corn Growers' Association, Essex, led in the discussion on this address, and a good deal of interest was evinced by those present on this important question.

The above papers and addresses are printed in full on page 92 of this report.

#### SASKATCHEWAN EXHIBITION.

*(Regina, Sask., January, 1910.)*

The members of our association in the province of Saskatchewan held their third annual exhibition of selected plants and seed at Regina, January 25-28, 1910, in connection with the Agricultural Societies Convention and Grain Show. Nine exhibits were brought out by five exhibitors and were judged by Mr. F. H. Reed, representative of the Seed Branch for Saskatchewan. Mr. Reed has kindly forwarded the following report on the showing made by the province.

'One member does not put up his sheaves in a manner to indicate that he would do careful work in hand selection; some of his sheaves at this year's Seed Fair contained stalks of pigweed or lamb's quarters, and last year we found in a sheaf of bearded wheat, a head of Red Fife wheat. The exhibit of another member was not one that would commend the work of the association. His group exhibit of oats contained wheat, barley and wild oats, while his group exhibit of barley contained so much wheat and oats that we did not award him a prize, although he was the only exhibitor. The exhibits from Mr. F. J. Dash and Mr. R. H. Carter were neatly prepared and gave evidence of careful work on the part of both these men. Mr. Dash's crop unfortunately was injured by frost this season. Otherwise his seed is of excellent quality, large and well filled except for the shrivelled appearance caused by frost.'

#### FIRST ANNUAL MEETING OF MEMBERS OF THE ASSOCIATION IN SASKATCHEWAN

*(Regina, January 28, 1910.)*

The first annual meeting of the members of the Canadian Seed Growers' Association resident in Saskatchewan was held at Regina on Friday forenoon, January 28. Hon. W. R. Motherwell occupied the chair and called upon Mr. F. H. Reed to present the report prepared by the secretary of the association on the work of the association in Saskatchewan. This paper is published elsewhere in this report.

After the presentation of the above report a paper prepared by Mr. Seager Wheeler, Rosthern, Sask., on 'Plant Breeding on the Farm' was read by Mr. J. A. Hand. Mr. Jas. Murray, superintendent Experimental Farm, Brandon, Man., next read a paper prepared by Mr. F. J. Dash, Hillesden, Sask., on 'Nine Years' Experience in Seed Selection in Saskatchewan.' An impressive address on 'How I Discovered and Propagated an Early Strain of Red Fife Wheat' was given by Mr. Geo. L. Smith, Saskatoon, Sask., while Mr. W. M. Black, of Creelman, Sask., followed with an interesting



talk on 'Some Results Obtained Through the Use of High Class Seeds.' Mr. Black explained that the seed used by him had been hand selected for several years, and the results obtained had been very gratifying.

The session closed with a remarkably able address by Mr. Jno. Mooney, Regina, Sask., on 'The Importance of Good Seed in the Production of Crops and How We can Increase our Commercial Supplies.'

Our Saskatchewan members are to be congratulated in having among them men who have so firm a grasp of the situation and who have so broad an outlook.

The above papers and addresses are published on page 107 of this report.

#### MANITOBA EXHIBITION.

*(Brandon, Man., March, 1910.)*

The annual exhibition of plants and seed selected in 1909 by members of our association resident in Manitoba was held as usual in connection with the Winter Fair at Brandon, March 5-11, inclusive, 1910. Mr. F. H. Reed, representative of the Seed Branch in Saskatchewan, kindly took charge of this exhibit and did the judging.

The report of the secretary of the fair indicates that this exhibit showed very little advance over former years and was somewhat disappointing, considering the increasing number of members who are doing good work in the province.

The total number of exhibits brought out was 10, and the number of exhibitors only 7.

The Sweepstakes trophy, given by the 'Canadian Thresherman,' was won by Dow Brothers, Gilbert Plains, while W. H. English, of Harding, won the Canadian Pacific Railway special.

#### SECOND ANNUAL MEETING OF MEMBERS OF THE ASSOCIATION IN MANITOBA.

*(Brandon, March 9, 1910.)*

The second annual meeting of members of the Canadian Seed Growers' Association in the province of Manitoba, was held in the Winter Fair Building, Brandon, Man., on March 9, 1910. Prof. W. J. Black, principal of the Manitoba Agricultural College, Winnipeg, a director of the association, occupied the chair and called the meeting to order at 2.30 p.m.

Mr. F. H. Reed was asked to read the report on the progress of the work in Manitoba, prepared by the secretary, Mr. L. H. Newman, who was unable to be present. After some discussion the first paper on the programme, entitled 'Gleanings from the Work of Inspection of Seed Plots of Fellow Members,' was presented by Mr. Geo. H. Bradshaw, Morden, Man. This paper gave a very lucid description of the standing of the association in the province and pointed out the great need for more members.

Mr. A. Cooper, Treesbank, Man., next read an excellent paper on 'The Value of Careful Seed Selection in Maintaining the Standards of our Crops.'

A short address on 'Potato Breeding in Manitoba and some Results Obtained,' was given by Mr. Harold Orchard, Lintrathen, Man., and occasioned many favourable comments.

A discussion of the question of false wild oats was opened by a paper sent by Mr. N. Criddle, Treesbank, Man., who was unavoidably absent. This was followed by a second paper on the subject by Mr. Geo. Dow, Gilbert Plains, Man., setting forth the results of original investigations.

These papers are published on page 99 of this report.

# THE TRADE IN REGISTERED SEED AND THE ISSUING OF CERTIFICATES OF REGISTRATION.

The accompanying tables give the production and disposal of General Crop Seed for 1908 and 1909, respectively:—

Bushels of "General Crop" Seed produced in each province in Canada, in 1908.								Disposal of "General Crop" Seed of 1908 crop.	
Crop.	Alta.	Sask.	Man.	Ont.	Que.	Mari-time Prov.	Total.	All Canada.	
								Offered for sale in seed catalogue.	Certificates issued for general crop seed.
							Bush.	Bush.	Lbs.
Wheat .....	80	391	1,253½	376	163½	381	2,645	2,454	52,000
Oats .....		143	2,980	2,164½	736	1,319	7,342½	1,193.4	41,000
Barley .....			360	355	35	532	1,282	356	2,400
Peas .....						20½	20½	8	
Corn .....				3,887			3,887	970.5	
Potatoes .....			63				63	43.5	
Total ....	80	534	4,656½	6,782½	934½	2,252½	15,240	5,025.4	95,400

Bushels of "General Crop" Seed produced in each province in Canada, in 1909.								Disposal of "General Crop" Seed of 1909 crop.	
Crop.	Alta.	Sask.	Man.	Ont.	Que.	Mari-time Prov.	Total.	All Canada.	
								Offered for sale in seed catalogue.	Certificates issued for general crop seed.
							Bush.	Bush.	Lbs.
Wheat .....	393	813	1,763¾	491	117	523	4,200¾	1,869½	98,000
Oats .....	1,150	620	2,137	488	728	1,046	6,169	2,595	67,800
Barley .....		185	1,525	275		25	2,010	1,225	58,300
Peas .....						36½	36½	8½	
Corn .....				695			695	636½	
Potatoes .....			390	57			447	5	
Total ....	1,543	1,618	5,815¾	2,006	845	1,630½	13,558½	6,339½	224,100

Our catalogue of seed produced in 1909 and offered the public is the largest yet issued. An examination of the table will indicate exactly what quantities of the various crops are offered. In addition to the general crop seed offered, a considerable quantity of improved seed is given publicity in this publication—seed produced from 3181—3½

registered seed and seed which is not registered, but which is known to be above the average in quality—to be exact, 7,997.2 bushels of this sort of seed are offered for sale in this catalogue.

The demand from foreign countries for seed grown under our supervision has been considerable. Inquiries from United States, South Africa, Australia, New Zealand, Germany, England and Scotland have been received within the past few months. Oats produced by our members have given good satisfaction under tests conducted at the Aberdeen College of Agriculture, Scotland, and as a result orders from Scottish farmers have been received on the recommendation of the above institution.

### TREASURER'S REPORT.

As treasurer of the association, I beg to submit the following financial statement for the period between February 4, 1909, and February 10, 1910:—

#### RECEIPTS.

To balance from last year . . . . .	\$ 471 38
To appropriation from Dominion Government for the current association year . . . . .	4,000 00
	<hr/>
	\$4,471 38

#### EXPENDITURE.

Salaries . . . . .	\$2,195 40
Travelling expenses . . . . .	440 75
Printing . . . . .	246 25
Exhibitions of selected seed—	
Maritime exhibition (Amherst, December, 1909) . . . . .	\$236 02
Ontario exhibition (Guelph, December, 1909) . . . . .	225 30
Brandon exhibition (March, 1909) . . . . .	77 15
St. Hyacinthe exhibition (April, 1909) . . . . .	89 70
Saskatchewan exhibition (January, 1910) . . . . .	53 00
Incidentals . . . . .	57 95
	<hr/>
	739 12
Transportation . . . . .	45 95
Office supplies . . . . .	76 50
Expense of convening the fifth annual convention and of translating report . . . . .	426 69
Telegraph and telephone . . . . .	3 44
Sundries, including cost of seeding experiment . . . . .	24 25
	<hr/>
	\$4,198 35
Balance . . . . .	\$ 273 03

(Signed) L. H. NEWMAN,  
Treasurer, C.S.G.A.

We hereby certify that we have examined the accounts of the association and find them correct.

(Signed) L. S. KLINCK,  
F. C. CHITTICK.



## DISCUSSION OF THE SECRETARY'S REPORT.

The CHAIRMAN.—You have heard the report of the secretary-treasurer, touching on almost every aspect of the very varied activities of this association in connection with the improvement of seeds. I would invite Mr. Macoun, of the Experimental Farm, to lead in the discussion of this report.

Mr. MACOUN.—Mr. Chairman and members of the association,—I hardly know how to open a discussion on such an exhaustive paper as your secretary has presented; but perhaps I might say a few words in regard to the work of the association, to the report as a whole, and to some special matters in it. For the first ten years that I worked on the experimental farm, I was doing experimental work with cereals, so that I have some idea of the difficulties which the association has to deal with, and also some of the great opportunities it has for the development of better seed in this country. For the last eleven years I have been devoting my time especially to horticulture and to work with the seeds which are used by the horticulturist, so that I am able to offer a few suggestions on some work which I think you could do to aid the horticulturist in getting and using better seed. It seems to me that there are three great objects which this association should have in view: First, to awaken greater interest in better seeds; second, to try to make available to the farmers in this country the best seed that can be had; and third, to make it as widely known as possible that such seed is available and that it will pay every farmer to use the very best seed he can get. Mr. Newman has told you that there is not enough seed to supply the demand, and it seems to me that that is a very good omen for the future of this association. But I believe there is still a great work to do in educating the average farmer as to the great advantage it would be to him if he used the best seed he could get. If there were a greater demand on the part of the farmers for better seed, we would have more seed growers in this association. I believe you could do a great deal of work in supplying literature to the farmers of this country, especially with the idea of showing them the value of better seed. We have from the United States a horticultural paper called 'Better Fruit.' It seems to me the title of that paper is the most inspiring of any agricultural or horticultural paper that I know of, and if you could have some literature bearing on the facts that prove that better seed is profitable, I believe it would attract attention and do much good. We have a great many farmers who are comparing the improved seed with their old seed, and I think if there were some literature prepared showing the results farmers have had with good seed, it would go much further than any report the government could publish of what is being done at the experimental farms, because I think these reports from the farmers would appeal more strongly to the farmers than a government report, no matter how good it might be. Mr. Newman read you some results which farmers have had from improved seed and from their old seed. It seems to me that this association could do good work in recommending a certain few varieties to be grown in different parts of the country. Our farmers, and especially our horticulturists, are inclined to try everything that is new; and while I am a producer of new things myself in the way of fruits and vegetables, yet I believe that if we could induce our farmers to limit themselves to growing a few of the best sorts, it would be better and would raise the yield of the crops of our country. I do not think it would conflict with any other association in this country if your association would publish in a small bulletin a few varieties of the cereals and root crops which have been found by the experimental stations to be best suited to the different parts of the country. You have been doing a good deal of work toward the improvement of cereals, but I feel you can assist the horticulturist more than you have so far by undertaking some experiments showing the value of Canadian grown seed of horticultural products. The main objection to growing seed in this country is the cost of growing it, but I believe this difficulty could be overcome by this association in some way, if it set about it. The vegetable growers of many sections of this country are

growing strains of quite a number of different vegetables themselves. I know our best vegetable growers are growing their own strains of tomatoes, and they believe they are better for their purposes than any other they can get. Others are growing melons, beans, peas and so on. I believe that if we could show that Canadian grown seed of certain kinds of vegetables and root crops is better than imported seed, there would be some solution of the difficulty of the high prices we have to pay for homegrown seed because the cost of the seed is nothing compared to the improvement of the crops obtained by using the very best seed. Speaking of one particular crop, I would like to say a word to emphasize something said last year in regard to the production of seed potatoes. I have been interested in potatoes for 21 years. We have found, from a number of years' experiments, that potato seed imported from a cooler and moister climate will give better results than potato seed grown in the dryer parts of Ontario. That has been clearly demonstrated in Europe and I think we have shown clearly at the experimental farm that seed potatoes from the maritime provinces or from certain parts of Quebec and Ontario will give much better results than home-grown seed, and I believe it would pay our growers to import their seed potatoes from those cooler and moister parts of the country. I feel more convinced of that fact every year.

The CHAIRMAN.—There is so much in common with the report of the secretary and the papers by the district representatives of the Seed Branch that I think I will call for these papers now. If there be any further discussion regarding the policy of the association, it can be continued after these are presented. I will call first on Mr. S. J. Moore, representative of the Seed Branch in the maritime provinces.

(For Mr. Moore's paper, see page 58).

The CHAIRMAN.—We will now hear from Mr. J. C. Coté, representative of the Seed Branch in the province of Quebec.

For Mr. Coté's paper, see page 60).

The CHAIRMAN.—May I, without encroaching for more than a moment upon the field that Mr. Grisdale will so well cultivate in a few minutes, say a word or two about these papers. I recognize that the association is greatly indebted to the district representatives of the Seed Commissioner's Branch for the invaluable work they do for our members. They communicate information of real value. They impart knowledge to these men regarding the principles and the application of principles by methods which advance their education as seed growers. They communicate enthusiasms, without which seed growing cannot be pursued, because it is not, as yet, a money-making activity; it is a great public service. Zeal without knowledge peters out; but zeal with knowledge leads to good service and fine civic action. So I am glad that visits are made to the fields of the seed growers by these district representatives. They lead to what I may call 'the understandingness of things,' which includes knowledge and enthusiasm in purpose, skill in application, and wisdom in management. As we are able to do these things better, we are making good progress in seed growing and in all other things whereby man can express himself through crops.

We will now hear from Mr. T. G. Raynor, representative in Ontario.

(For Mr. Raynor's paper, see page 60).

Mr. SIMMERS.—May I ask Mr. Raynor to qualify his remark concerning the car-load of oats, or to tell us whether it was a seedsman or a seed merchant who got the four varieties. There is a difference in the name. I do not want it to go on record that it was a seed merchant.

Mr. RAYNOR.—My information came from a seed merchant who said there were two prominent seed merchants concerned in the deal.

Mr. SIMMERS.—How long ago?

Mr. RAYNOR.—A number of years ago.

Mr. SIMMERS.—Twenty-five years ago?



Mr. RAYNOR.—I do not know.

The CHAIRMAN.—I believe Mr. Reed, the Seed Branch representative for Saskatchewan is not here, but has sent a communication to the secretary and not a report. Mr. McKillican from Alberta has sent a brief report.

(This report was read by the secretary and will be found on page 62).

The CHAIRMAN.—We shall now have an opportunity for a brief discussion of these papers and also of the report of the secretary-treasurer—if what Mr. Macoun has said should be supplemented by any one else. May I say, in calling upon Mr. Grisdale, of the Experimental Farm, to lead in this discussion, how highly we appreciate the quality of the work done by the staff of the Experimental Farms, central and branch, Dominion and Provincial. The address by Mr. Macoun was a good example of the clear thinking and wise expression of these men. I could not help thinking that I had myself had the happiness of observing fine growth in this man during his 22 years of consistent, earnest and successful labour for Canada and Canadians. My first acquaintance with Mr. Macoun was seeing a slender youth in his shirt sleeves. A shirt-sleeves man he has always been, with the decks cleared for action. No further self-sacrifice is good than the sacrifice of the lower to the higher all through. From the progress he has made, I expect a good deal from him. He has come to his majority. He has been fully 21 years at work. Let us join Mr. Macoun, Mr. Raynor, and any one else who seeks to bring about on the farm direct illustrations of what we have been talking about. Such illustrations, by and to the farmers, would not displace what the experimental farms have done, but would make avenues through which their work would find more fruitful expression all over Canada. I have pleasure in introducing Mr. Grisdale, who, in another department, is quite a match for Mr. Macoun.

Mr. GRISDALE.—I feel as though the field had been exceedingly well covered by the preceding speakers—those who gave their reports and those who commented on them. But while the reports were being made, a few thoughts occurred to me which might bear expression. I am, as you are probably aware, more particularly interested in animal life than in plant life; although incidentally, and to a very large extent too, I am interested in the growing of crops for the maintenance of these animals. Hence good seed to me is indirectly an important consideration, as it is to every farmer, and I have watched with great interest, and participated in to a certain extent, the work which this association has been carrying on.

One point to which you give a good deal of attention, but which it seems to me does not meet with quite the emphasis it should, is the importance of thorough cultivation. Any variety of seed will do better if it gets extra good cultivation than under average cultural conditions. There is no doubt in my mind that even the worst varieties, and much more the best, would be improved if we could induce our members to give their fields thorough cultivation. The results would be evident, and very evident, judging by the crops I have seen growing on the farms of some of the members of the association, in the way of greater yields, better quality, and freedom from weeds. To emphasize this point of the great necessity of doing everything we can to encourage our farmers, to persuade our seed growers, to get rid of weeds, let me tell you of an experience of my own. A year ago last July, one day I left St. Hyacinthe to come up to Ottawa. When I got on the train, the first thing I noticed was a field of grain. It was in late July, and the grain was nearly ripe. Amongst it was sow thistle and other weeds. Struck by the large number of bad weeds, I looked at the next field. It was just as bad. I decided that I would watch every field on the right hand side of that train coming to Ottawa, and in all that journey only two fields seemed to be free from weeds. They were a little more backward than the average, so one could not tell what was really the state of things even in those two cases. This weed eradication is a point of great importance.

One of the gentlemen said something about producing seed true to type. I have also heard criticisms here and there of the seed put on sale, seed reputed to have been



produced by certain of our members, not being true to type, not being in every case very good. I think that a good idea would be to ask every member who is allowed to advertise in the list as it is issued by the association to grow nothing but that one variety of oats or wheat on his farm. There is no objection to growing wheat, oats and barley, but only one variety of each kind of grain should be grown by any one member. If he is growing Banner oats, let Banner oats be the only kind of oats grown on his farm. I see no reason why that regulation should not be added to your list, if it does not exist, as I believe it does not; or, if it does, it is not carried out. This is a point of value to the man himself and to seed growers in general. It would help the man himself to get the best possible seed of that variety.

Another point which I might mention is the price of seed. One gentleman advocated raising the price and Mr. Raynor said he disagreed. Now I represent only my own opinion, but I believe it would be better to raise the price. My reasons are several. In the first place, if the seedsmen—and I see some of them before me—have anything new to offer, they do not try to induce the farmers to buy it by putting the price down to bedrock. If your seed faker has something new, he wants \$1.00 or \$1.50 per pound for it. We have lots of men like that in Quebec. If the seedsman who pretends to be an improver or rejuvenator of seed—and is an improver of seed in many cases—has seed for sale, he does not undertake to sell it for a dollar a bushel; he puts the price up to four or five dollars a bushel. If the seed growers are to get more men interested in the thing, one way is to ask a good round price for good seed, and sell only the very best. That would be one way to help the Seed Growers' Association surpass the faker and rejuvenator, and in many cases the seed grain merchant.

One more word about this faker. He is a deadly enemy of this association in the province of Quebec. I have seen his work all over that province, and in every instance it has been work that destroyed. Men who have tried the seed and paid high prices for it have concluded, from the results obtained, that all improved seed, all extra special seed, is a fake, and it takes time to reconvert them to the idea that there may be something of value in well bred seed, as in other things. I think we should also do everything we can to encourage short rotations and better cultivation. The advantages would be tremendous, not only to the seed grower but to the average farmer.

Mr. SIMMERS.—I think it an important duty of this association to impress on farmers that goods delivered by them should be equal in quality to the sample shown. I think the farmer often delivers goods which are not true to sample. When one gets a quantity of inferior stuff from this source and makes a complaint, it is hard to get redress.

Mr. THOMPSON.—Mr. Moore and Mr. Grisdale emphasized the importance of greater attention to cultivation. We hear a good deal of criticism of seed dealers, and perhaps they deserve some of it; but there is often a disappointment from high-priced seed which had not been given a fair trial. People have laid too much stress on the new variety and have not given enough attention to the cultivation which it should receive. Last spring, in districts which were properly cultivated and drained, farmers had grain which ripened a week or ten days earlier than on farms not so well cared for. Good crops were obtained in spite of the wet. If more attention were paid to cultivation, there would be less disappointment in regard to seed. More attention should be paid to drainage and to the conservation of moisture. Without moisture in the soil, it is impossible to get the seed started or to get the plant to develop. Now we have a conservation commission, of which Dr. Robertson is a member, I think one point should be the conservation of moisture in the soil. There is enough moisture every year to produce good crops, but we should be better able to hold it.

Prof. C. A. ZAVITZ.—I think I can appreciate quite well the difficulty which Mr. Newman and the other men have in trying to represent here at a meeting the good

work which has been carried on through the whole country. Mr. Chairman, you referred to the work of those men who are going around in connection with the department and the association, and I know, from what I have seen of the work of Mr. Raynor in the province of Ontario, and the work of others, that they are having a wonderful influence, not only in the production of good seed, but in different lines of educational work in agriculture. This work is of much value, and yet it is practically impossible to bring a full report of it to the meeting. I believe one of the greatest values in connection with this work is that of training men to do things along definite lines. Mr. Raynor spoke of Mr. Gies getting the wheat with the five grains per spikelet. This is the outgrowth of the work of observation. I believe this association will stimulate thoughtful men to do work of this kind and will in that way have an additional influence. Mr. Raynor spoke of the samples at Guelph. Mr. Clark and I judged at the winter fair, and we had one class of oats in which there were over 80 entries. We examined these and selected twelve lots which we considered the best. There were two bushels in each bag. We had a trier and ran it down to the bottom of each bag and took out a sample representing the bag. We turned these oats out on the table and examined them. Without a single exception, those twelve lots of oats had not one single weed seed. This is an evidence of the good work of this association and various other organizations. Those men who are going around at the seed fairs and in the inspection of the grain in connection with the carrying out of the Seed Control Act are having a very wholesome influence.

Mr. SHUTT.—In judging seeds at fairs, do you take into consideration the percentage of vitality? This is an important matter to the purchasers and sowers of seed. I ask this because of what Mr. Simmers said—that the seed supplied by the grower was not equal to the sample submitted. If it was a question of vitality, might not the inferiority referred to be due to the manner in which the seed had been kept? The question of vitality is one fully as important as that of cleanliness, and our experiments have shown that the conditions under which seeds are kept may have a marked influence on their vitality. If the seeds are kept in an atmosphere that will cause them to dry out, then they will lose their vitality. If they are kept at such a temperature and in such an atmosphere that the moisture content of the seeds remains practically unchanged, then the falling off in vitality on storage will be slight. The falling off in vitality is proportionate to the drying out of the seed. It is not a question of length of time, evidently, which is the determining factor, nor is it simply a matter of temperature but largely of the humidity of the air in which the seed is stored. The question bears on this matter of sowing good seed, for good seed naturally should have a high percentage of germination. I cannot quote from my data now, but in this connection we tested seeds of cereals and legumes and of the cruciferae, and we found that under certain conditions of storage they dried out, and as they dried out they lost their vitality.

Mr. SIMMERS.—My question was not one of vitality but of cleanliness. What was sent was said to be representative of the whole lot, but when we got the bulk of the seeds together, there was a pretty large percentage of weed seeds and of small grain.

Mr. CLARK.—In connection with the seed fair work in western Canada, we have difficulty in some years with frozen oats or barley. When the vitality is doubtful, samples of the exhibits are sent to the seed laboratory at Calgary before the prizes are awarded, and the prizes are ultimately awarded only to those exhibits which have a high percentage of vitality. A few days ago I visited the corn exhibit at Essex. I watched the work of the judge who sorted out those exhibits of corn that had been fully matured and, so far as could be determined, would give 90 per cent of growth. I regret that a large proportion of the corn shown, particularly that of the late varieties, was precarious in the matter of vitality. Those that were deficient in vitality were eliminated from the prize-winning lots.

Mr. WOOLFORD.—I think I would be a little remiss did I not tell of the work that is being done in Alberta, as I believe I am the only representative from there.



I have been identified with this association for some years, working with Turkey Red wheat; but as we have suffered severely from frost, and occasionally from hail, which is much worse, our work has been handicapped. Being personally acquainted with your representative in Alberta and working under his observation, I am in a position to say that he works hard and long for the improvement of seed and of farm crops generally. I may say that in Alberta our conditions are somewhat different from those in most other parts of the Dominion. In regard to Turkey Red wheat, we have, as a whole, a very mixed lot. There is a reason for this. When the Turkey Red was introduced into our country from Kansas it was reasonably pure. Mr. E. E. Thompson imported a large quantity which was distributed in different parts of the province. It proved to be an excellent variety, but the wheat shipped in was inferior. I would call it No. 3 or 4. The next year it was grown, there was a great improvement in quality. Unfortunately, however, one of our large growers of the Odessa variety who wished to try the Turkey Red, disked in the seed of this variety on Odessa stubble. In the following year, instead of having a pure crop of Turkey Red, he had one-quarter of Odessa and three-quarters of Turkey Red.

The difficulty at that time with wheat was mainly from smut, as many farmers took their seed to the field without cleaning and treating it. As a consequence we had in 1905 a crop one-third to one-quarter of which was smutted. Through this association and the efforts of Mr. McKillican this smut question has been taken up and Alberta has taken on a fresh impetus for good seed. Since this association has been in operation, the yields of our wheats have increased and every farmer in southern Alberta has reaped a benefit. I have no trouble in getting customers and a much better price for my improved seed. I expect to quit farming on a large scale and move nearer town, where I shall devote the rest of my time to seed selection, and hope to be of more benefit to the association than in the past.

The CHAIRMAN.—We have had a number of exceedingly valuable contributions to our knowledge and to our enthusiasms. Shall we have the meeting adjourn and have this discussion, so far as necessary or desirable, resume to-morrow?

On motion of Mr. Innes the meeting adjourned.

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#### EVENING MEETING, 8 P.M., FEBRUARY 10, 1910.

The evening session of the sixth annual meeting was called to order at 8 p.m., the President, Dr. Jas. W. Robertson, in the chair.

The CHAIRMAN.—Prof. Zavitz, of the Ontario Agricultural College, will give us an address on 'Heredity in Plants and its Bearing on Agricultural Problems.' Prof. Zavitz needs no introduction to the association, being one of its charter members and one of its most enthusiastic and willing workers. To those who know less of the progress of agriculture in Ontario than I do, I may be permitted to say—I do this for the sake of exalting my own reputation—that Mr. Zavitz was one of the students whom I had the honour to teach in one little branch of agriculture. Mr. Zavitz is an observer—a man who knows how to observe closely, carefully and accurately; a thinker who thinks toward expression—an expression not only in words and not only in ideas, but in the living things called plants, that somehow take the form of his thought, and to that extent, and perhaps to a far larger extent, prove that he also is of the divine nature. He is not only a thinker in plants but an expression in organizations for the furtherance of civilization in its basic forms. I remember when his thought was the Experimental Union, with, I think, about twenty members. Now Ontario is enriched by a union having several thousand active members; and that is largely because Mr. Zavitz kept thinking toward expression, so that Ontario is not only the image of his thought in that regard, but is in its essence a veritable part of his thought. That is worth while—being divine in as big a way as that;



thinking toward rural conditions, and, what is one better, toward rural life for the boys and girls.

(For Prof. Zavitz' paper and the discussion thereon, see page 49).

The CHAIRMAN.—In introducing Mr. Groff to present this paper on Gladioli, I do not bring in a foreign subject or a teacher who has no relation to our work. Flowers, of course, minister to pleasure, to pleasure pure and undefiled. Hardly any other sensuous joy comes into the class with that which flowers bring. Flowers to me are part of nature's fine arts; and when nature does the work of the artist and gives us flowers, it is something worth while. Human art is a clumsy effort to copy nature's fine art—the fine art of representing through flowers the means by which plants reproduce life until it is all beautiful and lovely. When any artist on canvas or stone plies the craft, he comes far behind nature. Was it not one of the fine sayings of a great artist when the Teacher, strong and nourishing in every sense, said, 'Consider the lilies how they grow'? Consider the gladiolus how it grows, and Mr. Groff will be the teacher.

(For Mr. Groff's paper, see page 52).

The CHAIRMAN.—I am sure we are indebted to Mr. Groff for his contribution to the literature of breeding plants. I hope there will be continuous co-operations among those who seek to apply processes of improvement to flowers and field crops. I think the breeder of flowers may shed much light on how we may produce things to eat, how we may get better flavours and hardier foliage to resist disease. That is my hope; that is my faith. I would like to have a few words from Mr. R. B. Whyte, who is one of our noted and wise citizens, and also from Mr. Macoun, of the service to Ottawa that comes from this beautiful flower.

(For the discussion by Messrs. Whyte and Macoun, see page 56).

The CHAIRMAN.—Fine energy, good thinking, inspiring counsel—this is what helps our people to make the most of themselves and their conditions. I am going abroad to fill up an appetite hungry for new knowledge, new power. I will have, if spared, a presidential address for next year. Meanwhile, one is not necessary this evening. We are grateful to these gentlemen for giving us their addresses to-night.

(The meeting adjourned at 10.15 p.m.)

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## MORNING SESSION, FRIDAY, FEBRUARY 11, 1910.

The meeting came to order at the call of the president at 10.30 a.m., and the report of the nominating committee was received. Dr. Jas. W. Robertson was nominated president while the following ten men were nominated to form the first ten of the board of directors, who, according to the constitution, are to be elected by the association as a whole: Prof. C. A. Zavitz, Messrs. W. W. Hubbard, Deputy Minister of Agriculture, Fredericton, N.B.; G. A. Gigault, Thos. H. Woolford, Cardston, Alta.; J. Demitriou, Oka, Que.; Hon. W. R. Motherwell, Minister of Agriculture, Regina, Sask.; Thos. S. Waugh, North Bedeque, P.E.I.; J. O. Duke, Olinda, Ont.; John Mooney, Regina, Sask.; S. A. Bedford, M.A.C., Winnipeg, Man.

It was moved, seconded and resolved that the report of the committee on nominations be adopted.

The CHAIRMAN.—For myself and for the directors who have tried to serve this association in the past, I express our thanks to you for continuing us in office. We have to you something of the same feeling of gratitude which we have toward the Department of Agriculture—a lively sense of things to be done in the coming year. We are all the more sincerely grateful because the holding of office brings us no compensation except opportunities to serve you and other farmers. We renew the expression of our appreciation of your kindness in putting us in this responsible place.

The first item on the scientific side of our programme is a paper on 'Some Experiences in Crop Raising with Special Reference to the Potato,' by Wm. H. Taylor, of St. Giles, Que.

(For Mr. Taylor's paper, see page 63.)

The CHAIRMAN.—This most suggestive paper by Mr. Taylor is open for a brief discussion. I shall speak for only a moment. I want to give Mr. Macoun just a minute or two to collect his very many thoughts while I say a little about this paper myself. I am much obliged to Mr. Taylor for giving us a glimpse into his methods. He is not ashamed of being an Englishman. A few people in Canada recently have made a practice of advertising, 'No Englishman need apply.' But an Englishman never applies to nature by means of intelligent labour without getting a return. That kind of an Englishman may apply for any kind of a job. The man who need not apply is the man who is ashamed of the hoe or who is unable or unwilling to use one. The hoe is the type only. The Englishmen who are typical of the English race are always seeking improvement for themselves and in themselves. They have not that reasonable measure of satisfaction with themselves that they say the old Scotch patriarch had, whose prayer was after this fashion: 'May the guid Lord gie me and my bairns' bairns after us for ever, a reasonably guid opinion o' ourselves.' The English seek improvement. This man Taylor gets as much like and as near to the Irish as he can by cultivating the potato. That is one way whereby the prosaic English imbibe from the most romantic of peoples—the rich, poor Irish. I liked his mention of buckwheat. How many of us see any good in it? He turns this seeming ill into intellectual, social and agricultural good. He knows every man is as lazy as he dares to be. He brings along the buckwheat and says, 'Wake me up, old fellow.' I did not quite catch his meaning about the relief from the buckwheat not answering back. I am reminded of the man who did not like suffragettes and whose wife happened to be one. Unlike buckwheat, she did talk back. This woman was going on for her husband's conversion, citing the case of the neighbouring saloon keeper, and demanding, 'Why should that man who sells liquor, who keeps a saloon, why should he have a vote and not I?' Her husband's harsh reply was, 'Because he shuts up at 11, my dear, and you never do.' After all, buckwheat never answers back. Perhaps that is why it is dull, if good. Mr. Taylor referred to the prenatal influences. But how can I get after my grandfather, do you suppose? I do not know where he is. I have my doubts whether the Lord will let me join him. My grandfather had a lot to do with me, but how can I get after him to suggest any improvement that would count in me now? How can you get after the grandfather of your potatoes? The Japanese do that beautifully, and they are the only people that do. When any one does anything illustriously helpful, in our day and generation, to the state, the head of the state, presumably acting for us, gives him a title and makes him noble. We enoble him. Then by and by his sons and his sons' sons, who are lazy and selfish, carry the noble title. We are too hasty. We gave a noble name to the family and the quality of its service has petered out. When any one does anything worth while in Japan, they raise his grandfather and his great grandfather, and so ennoble his ancestry. This is a fine principle. It is a fine policy. That is statesmanship; that is Christianity. Not unto us! But unto Him and unto her and him that made it possible! If we can make a better wheat plant for the west, and in fifty years, when competition is more keen than it is now, help those people out, that is fine statesmanship. We are doing this prenatal trick ourselves, and I am glad my friend brought it up. It should give us a permeating ideal for labour for Canada. A man with a hoe is not a mean man, as a blind artist once depicted him. A man with the hoe is a partner with the Almighty, making the earth a better home for the race. I am glad we have such men; let us give each other more encouragement to go on with our tasks.

(For further discussion on Mr. Taylor's paper see page 64.)

The CHAIRMAN.—I have much pleasure in calling on Mr. Archibald, of the Agricultural College, Truro, N.S., for a paper.

(For Mr. Archibald's paper see page 66.)



The CHAIRMAN.—I am sure we are very glad indeed to hear from the eastern part of Canada. I believe it is the first time we have had a report from the Agricultural Experiment Station at Truro, and we now look forward to results of experiments from that part of the Dominion. As these institutions are spreading, we are getting additional information from different parts of Canada. We are pleased to welcome Mr. Archibald and to have this account of his work.

(For the discussion on Mr. Archibald's paper see page 68.)

The CHAIRMAN.—We will now have a short address from Prof. Shutt, on his more recent observations on 'The Influence of Environment on the Composition of Wheat.'

(For Mr. Shutt's address see page 69.)

The CHAIRMAN.—I am sure we are grateful to Mr. Shutt for bringing this matter before us again.

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#### AFTERNOON SESSION, FRIDAY, FEBRUARY 11, 1910.

The afternoon session opened at 2.15, Mr. Gigault, second vice-president, in the chair.

The CHAIRMAN.—The president and Mr. Zavitz, the first vice-president, being absent, you will unfortunately have to allow me to preside, as one of the vice-presidents. The first order on the programme is new business. This morning you appointed ten directors. In virtue of the constitution, those ten directors have the power to add ten other directors to their number to complete the board. They have done so. The names of these new directors are as follows:—

Jno. Bracken, Prof. M. Cumming, Geo. Harcourt, Deputy Minister of Agriculture, Edmonton, Alta.; J. A. Wheaton, Toronto, Ont.; Geo. Batho, Winnipeg, Man.; Prof. W. J. Black, M.A.C., Winnipeg, Man.; Wm. Thompson, London, Ont.; Theodore Ross, Charlottetown, P.E.I.; Prof. L. S. Klink, Donald Innes, Tobique River, N.B.

We will now have a paper by Mr. Otto Herold, of Waterloo, Ont., on 'The Selection of Field Root and Vegetable Seeds in Canada.' I may say that Mr. Herold is a practical seed grower, coming from a seed growing district in Germany, where he spent over twenty years in seed growing. His practical knowledge of this subject will certainly add greatly to the importance of his paper.

For Mr. Herold's paper and the discussion thereon, see page 72.)

The CHAIRMAN.—Mr. Zavitz left a short paper on this subject and I invite the secretary to read it.

(For this paper see page 80.)

The CHAIRMAN.—I think the meeting would like to hear Mr. Macoun on this subject.

Mr. MACOUN.—I think Mr. Herold's suggestion, that his firm be admitted as a member of this association, should be dealt with at this meeting. I think something should be done to encourage the growing of vegetable seeds in this country. There is one way by which the association can do it, and that is by allowing those who grow vegetable seeds of special crops to become members of this association. I move that this be taken into consideration by the executive or by this meeting.

The CHAIRMAN.—What do you prefer, that it be decided by this meeting or by the executive?

Mr. CLARK.—The constitution allows the executive to deal with the matter.

Moved by Mr. Macoun, seconded by Mr. Thos. Waugh, that the executive consider the matter.



The CHAIRMAN (Dr. Robertson).—If there be any further discussion, I think it well to defer it until after Mr. Clark's paper on 'European Methods of Seed Selection in the Improvement of Field Crops.' We appreciate Mr. Clark's kindness in having gone abroad to gain information and then putting it at our service this afternoon.

(For Mr. Clark's paper and discussion thereon, see page 81.)

The CHAIRMAN.—The discussion will be led by Dr. Charles E. Saunders and Prof. L. S. Klinck. I hope it will not be confined wholly to them. I do not know two members of our association, in addition to Mr. Clark, who would shed more light on the problems he has presented, from our Canadian point of view.

(Dr. Saunders' remarks will be found on page 84.)

The CHAIRMAN.—I am sure that you have been more than gratified by the remarks made by Dr. Charles Saunders. We thank him for the view he gives us of the character and scope of the work carried on at the Central Experimental Farm. While the farm is in one sense chiefly for Ontario and Quebec, it deals with problems that arise from vast areas not yet inhabited; and by seeking the solution of those now, it may help Canada to be fifty years ahead of what it would have been, if the let-it-alone method had been allowed to prevail. We will now hear from Prof. Klinck.

(Prof. Klinck spoke at some length but requested that his remarks be not placed on record, as he hoped to have an opportunity of speaking more authoritatively later, after giving the matter another year's study.)

The CHAIRMAN.—Have you any particular questions to ask of any of the three gentlemen who have spoken? I may say for myself that I feel we are getting what we most need, not merely opinions, but knowledge, real knowledge concerning what happens in the course of four, five or ten years. We shall have a firm basis from which to ascertain the truth. All these means—cross-breeding followed by selection, mutants picked out by competent men, and good cultivation which we should seek to improve and make understood—will contribute to make better crops.

I should be glad if Prof. Black, the President of the Manitoba Agricultural College at Winnipeg, would give us the pleasure of such remarks as he may see fit to make.

(For Prof. Black's address, see page 86.)

The CHAIRMAN.—We are nearing the end of our programme and the limit of time at our disposal, but there is a little bit of Canada—not little in any but a physical sense—from which we have not heard. We have here from Prince Edward Island Mr. Theodore Ross. We would like to have Mr. Ross give us a few words on the Prince Edward Island point of view.

(For Mr. Ross's remarks, see page 87.)

At the request of the chairman, the report of the Resolutions Committee was presented by Prof. Klinck, as follows:—

Mr. Chairman and Gentlemen,—Your committee on resolutions begs to report as follows:—

(1) *Resolved*, That this convention places on record its appreciation of the continued assistance rendered the association by the Department of Agriculture in granting funds for carrying on its work, in printing and distributing the annual report and in so arranging that officers of the Seed Branch could assist in the inspection of seed plots of members.

(2) *Resolved*, That the thanks of the convention be extended to the railways for special rates granted the inspectors of the Seed Branch who inspect the work of members of this association.

(3) *Resolved*, That this association commend the work of the Ontario Corn Growers' Association in interesting the corn growers of Ontario in better methods

of soil culture and seed selection and in paving the way for the adoption of the more advanced methods employed by this association.

(4) *Resolved*, That this convention commend the policy of carrying on farm demonstrations in order to illustrate the comparative value and promote the use of improved seeds on a large scale, and to determine the benefits and methods of the conservation of soil and moisture and other means of crop improvement.

The above report was carried with applause.

The CHAIRMAN.—We have received an expression of regret from Hon. Mr. Fisher, who will be unable to reach Ottawa until the late train to-night.

I have now the pleasure and honour of proposing that Mr. H. H. Groff, of Simcoe, be created an honorary member of this association. We do not extend this honour to many persons, but the kind of work Mr. Groff is doing and his kindness in coming here to give us an address last night amply justifies such action.

Carried unanimously.

The convention was then brought to a close.







FIG. XXIV—Part of exhibit of Reid's Yellow Dent corn which won the Klink trophy for the best 25 ears of dent corn, any variety, grown in Ontario in 1909, according to the rules of the C.S.G.A. Grown by G. W. Coatsworth & Son, Kingsville, Ont. Note arrangement of ears into two groups representing two different types.





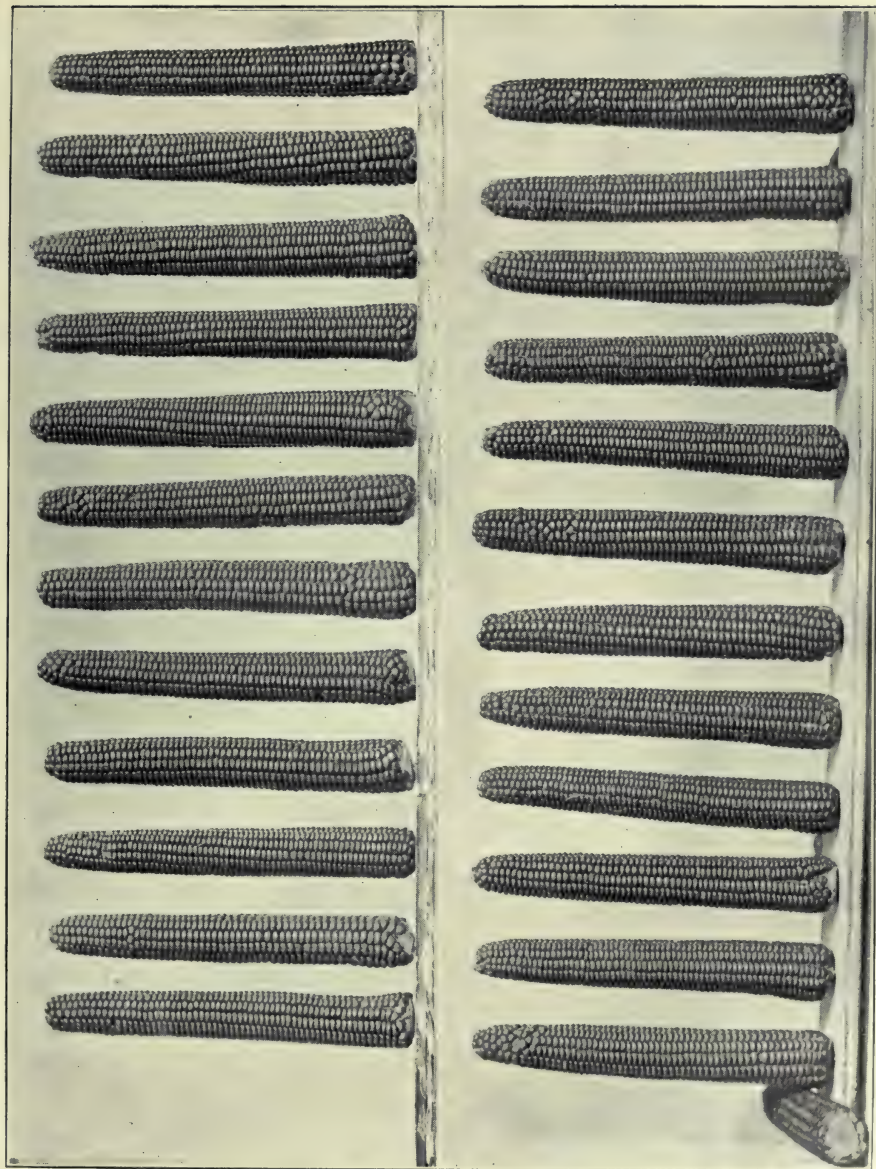


FIG. XXV.—Exhibit of Compton's Early corn which won the Bate Cup for the best 25 ears of flint corn, any variety, grown in Ontario in 1909, under the rules of the C.S.G.A. Grown by James Fletcher, Valetta, Ont.







FIG. XXVI.—First prize sample White Cap Yellow Dent corn, grown according to the rules of the C.S.G.A., in 1909, and exhibited at the Provincial Winter Fair, Guelph, Ont. Grown by B. A. Smith, Kingsville, Ont.

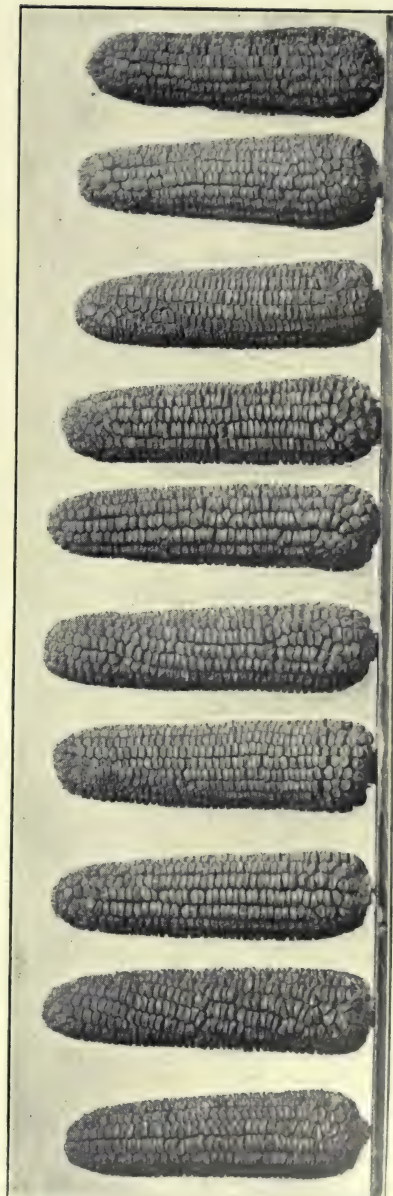
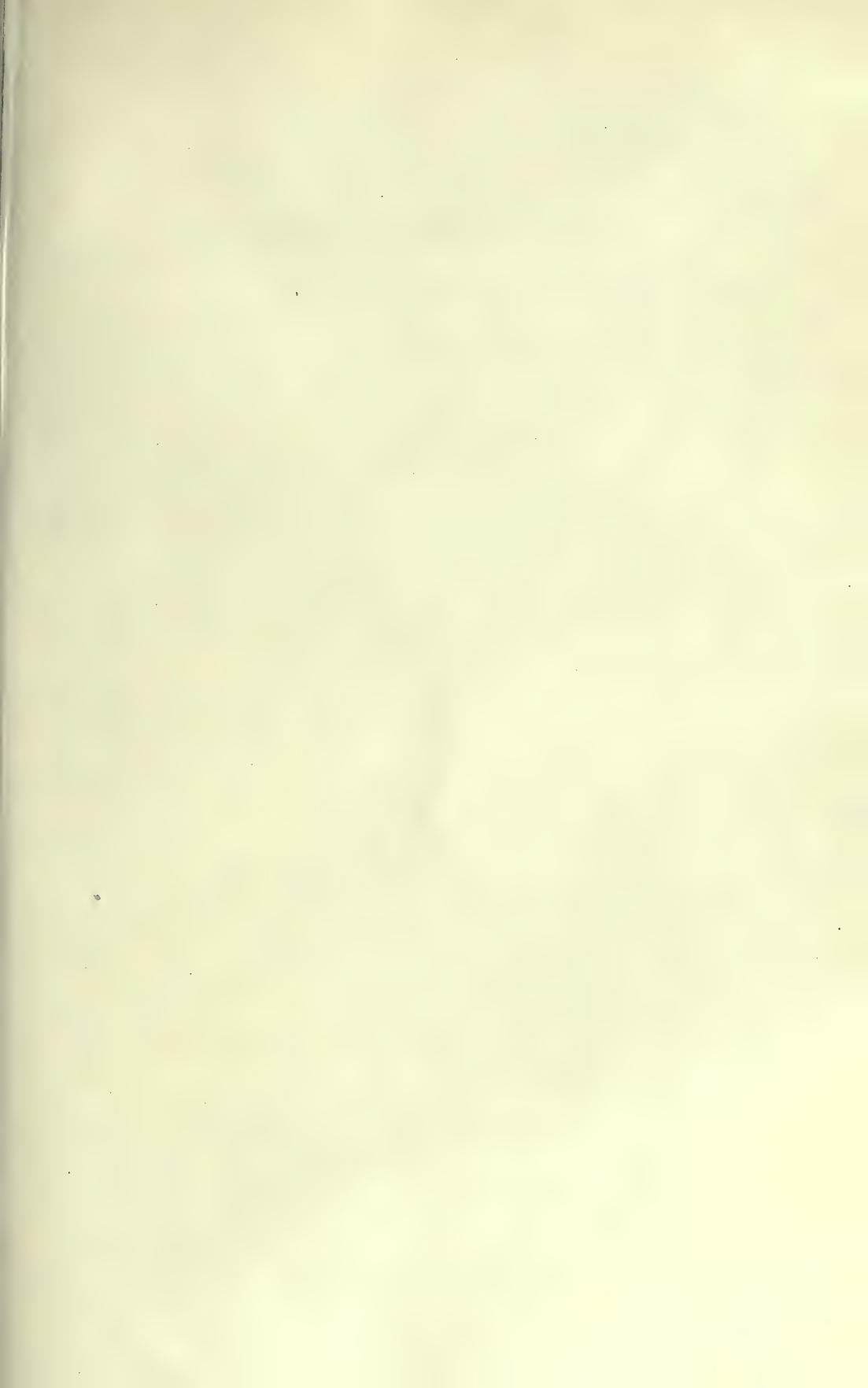


FIG. XXVII.—First prize sample Stowell's Evergreen (late str.) at the Ontario Provincial Winter Fair, Guelph, 1909. Grown by John McKee, Norwich, Ont.









## PART II.—PAPERS AND ADDRESSES PRESENTED.

### HEREDITY IN PLANTS AND ITS BEARING ON AGRICULTURAL PROBLEMS.

*C. A. Zavitz, Professor of Field Husbandry, Agricultural College, Guelph, Ont.*

Heredity may be described as the transmission of parental characteristics to the offspring. The laws of heredity in the plant world appear to be very similar to those in the animal world. Heredity in plants, therefore, is at the very basis of plant life, and consequently has a close relationship either directly or indirectly with the whole fabric of agriculture. It will be seen at the start that the subject which I have been asked to present is one dealing with some of the deepest problems of life and their relationship to the economic world. Some of the greatest scientists of the present day, such as DeVries in Holland, Bates in England, and Davenport at the Carnegie Institute, are making the study of heredity their life work; and other men of note, such as Burbank in California, the Garton Bros. in England, Nilsson in Sweden, Drs. Wm. and C. E. Saunders in Canada, Biffen of Cambridge, Webber of Cornell University, and Groff of Ontario, are working along the more practical lines of heredity as they apply to plant production. There has probably been no time in the world's history in which a greater number of men have been working on a greater interest manifested in the study of heredity than at the present time. The scientific investigations of Darwin, and Mendel, and DeVries, and Galton, and Weismann, and Bateson, and of many others, show us that, although great advances have been made in our knowledge of the laws of heredity, there are scarcely any of these leading scientists who will accept the conclusions of the others. While it is true that our knowledge of heredity is yet quite limited, it is also true that the advancement made during the last few years has been really wonderful. It is probably safe to say that no man in the past has exerted a greater influence in the scientific study of heredity than Gregor Mendel. At the present time, Mendelism has very strong supporters, and also very severe critics. It is undoubtedly true that the Mendelian law or theory of heredity is still, and will be for some time to come, the foundation of the scientific research regarding the laws of heredity. The work of Mendel has greatly changed the standpoint of investigation and has greatly altered the methods of research regarding the underlying principles of heredity in both plants and animals. Gregor Mendel was an Austrian monk who made very accurate observations of his prolonged experiments with peas. The reports of his observations were prepared and read at meetings in Austria in 1865, after which they were evidently lost sight of until they were rediscovered in the year 1900. During the last ten years, these results have been very carefully studied, and they form the basis of investigations in various parts of the world. The essential point which Mendel discovered is that, though a plant or an animal may be made up of a great many characters, those characters may possess an individuality manifested in the formation of the germ cells. A hybrid, when it comes to make its own germ cells, either male or female, makes them in such a way that each germ cell represents one of the pure, grand parental characters and not both: consequently, plant breeders of the present time not only study the individual plants, but look more particularly to the various characters which make up the plant as the units of heredity.

Men deeply interested in the improvement of plants and especially of those of economic value in agriculture and in horticulture are not only making a study of

plant breeding themselves, but are watching the results of scientific investigations in various parts of the world, in order to secure information which will help them in securing the desired results. It is scarcely necessary to state that there are but few men who have made a searching study in the laws of heredity and at the same time who are making as deep a study of the applications of those laws in meeting the needs of the people, in the work of plant improvement. During recent years, however, a few men are endeavouring to make a practical application to our common farm crops of some of the best scientific knowledge which they can secure. In order to get the best practical results from a study of heredity in plants in its relation to agricultural production, it seems necessary first to make a thorough study of existing varieties and then to endeavour to improve the best through selection and through cross-fertilization, in order to secure those improvements which are best suited to the conditions for which they are desired. I would therefore recommend most strongly to the scientific plant breeder and also to the practical farmer the importance of making a very careful study of the existing varieties most suitable for his purpose. That the force of heredity is great, can be seen by a study of individual varieties over several years. Allow me to draw your attention to two examples which will show the influence here referred to.

The introduction, the spread, and the value of the Red Fife variety of spring wheat in Canada show, to a marked degree, the influence of heredity and its bearing on agriculture. It is stated that in 1842, an Ontario farmer, by the name of David Fife, received from a friend of his in Scotland a little package of wheat which was taken from a cargo which had just arrived from Dantzic on the Baltic sea. Mr. Fife sowed the wheat in the spring of 1842, but it proved to be a fall wheat, and only one plant ripened. The seed of this plant was sown in the following year, and the crop grew and ripened well. This wheat was increased from year to year until it is now the most extensively grown variety of spring wheat in Canada. It is this variety which is closely connected with the great reputation which Canada has obtained from its production of the No. 1 hard wheat of the western provinces. It probably forms the basis of more plant breeding in wheat in Canada and in the northern states than any other single variety.

The history of the Dawson's Golden Chaff winter wheat is also interesting in showing the power of heredity, the importance of variety, and the results of careful observation. In 1881, Mr. Robt. Dawson, a farmer in the western part of Ontario, had a field of the old White Clawson variety. The crop was very badly lodged, but one plant was found in the field by Mr. Dawson which was upright in growth and handsome in appearance. Mr. Dawson selected this plant, and from it started what has become well known as the Dawson's Golden Chaff winter wheat. This winter wheat is now grown more extensively than any other variety in the province of Ontario. The crop retains its former good qualities of stiffness of straw, of the power to give a large yield of grain, and of its red chaffed beardless heads which contain comparatively short, thick grains which are white in colour.

This last example goes to show the importance of selection. Plant selection can be conducted in different ways. The method here illustrated was very simple and also very effectual. For plant selection in a more extensive way, one of the three following methods is usually adopted.

1. By making a composite collection of the most promising plants in the field.
2. By making a collection of the individual plants in the field which most closely comply with the ideal, in the mind of the plant breeder.
3. By the use of the nursery plot, where a large number of seeds are planted at equal distances apart, and from which individual plants are selected from those which have had equal advantages of growth and development.

In the former method, the seeds of the different plants are sown collectively, while in the latter two methods the seeds from the individual plants are planted and studied separately. While the principal work of the Canadian Seed Growers' Asso-



ciation has been along the line of the first mentioned method, any one of the three methods here referred to may be used as the foundation work by the members of the association, according to their desire. Those persons most deeply interested in the systematic work of seed selection usually adopt either the second or the third method, or both of these methods. At the Ontario Agricultural College both the last two methods have been in use, and some very interesting results have been obtained in securing improved strains of some of the leading varieties of farm crops, such as Dawson's Golden Chaff winter wheat, Red Fife spring wheat, Mandscheuri barley, Siberian Millet, &c.

In order to illustrate what has been done in this line, I wish to refer to what is now known in Ontario as the O.A.C. Number 21 barley. In the spring of 1903, 9,972 selected seeds of the Mandscheuri barley were planted by hand at equal distances apart in the experimental department at the college. When the plants were ripe, they were carefully examined, and thirty-three of the most promising ones were selected, harvested and threshed separately. In 1904, thirty-three separate lots of barley were grown from the plants selected in the year previous. From that time forward only the best strains were grown in the tests as follows: 14 in 1905, 8 in 1906, 7 in 1907, 3 in 1908, and 3 in 1909. In one instance, over forty bushels of barley were grown in 1905 as the product of one seed planted in the spring of 1903. Of all the selected strains, the one which is known as the O.A.C. Number 21 has made the best record. In each of the last three years, it has given better results than the Mandscheuri variety in yield of grain, in freedom from rust, and in both length and strength of straw in the co-operative tests throughout Ontario. The grain is quite easily distinguished from that of the Mandscheuri variety.

Even though much care is taken in the systematic selection of farm crops, we find that the best strains of the best varieties do not always possess a combination of all of the most desirable characteristics. The work of cross-fertilization frequently enables certain combinations which it seems exceedingly difficult to secure in any other way. At the Ontario Agricultural College, we have done a considerable amount of work in cross-fertilization with our leading varieties of winter wheat, spring wheat, oats, barley and peas within the past eight years. In 1909, we had upwards of 100,000 hybrid plants grown separately. The results are very promising. May I state, that within the last two years we have secured from small plots of our hybrids higher yields of grain per acre than those obtained from the leading varieties of oats, winter wheat and spring wheat. Some of the thinnest hulled and the most beautiful oats which I have ever seen are those obtained from one of our hybrids.

I believe that there was never a time in which there were such great opportunities for excellent work in plant breeding, either from a scientific or from a practical standpoint, as the present. Within the next few years, there is sure to be a much clearer conception regarding the laws of heredity, and a more wide-spread application of those principles to crop production.

Dr. JAS. MILLS.—I would like to ask Mr. Zavitz the name of this hybrid oat, and whether it possesses the desired characteristics.

Prof. ZAVITZ.—We have not named it yet. It is a hybrid which we have not yet distributed to farmers, and consequently its identity is represented by a number. It is comparatively free from rust and the straw is of good quality, but rather short. It follows the Joannette in length of straw. We have another hybrid with the same parentage which gives a larger yield per acre than any varieties we have ever grown. We wish we had a combination, so that the yielding properties of the one and the quality of the other could be united. We shall probably make another cross between these two hybrids. We are not yet satisfied in all particulars, but it is of the best quality of grain of any of the two hundred and fifty varieties of oats which we have grown.

Dr. MILLS.—Can you deal with hybrids in crossing, the same as with old standard varieties?

Prof. ZAVITZ.—After the two hybrids are constant in their characters, we can deal with them in as definite a way as with the standard varieties from which the hybrids themselves were produced.

Mr. WOOLFORD.—I should like to ask one question in regard to the wild oat and the tame oat. In doing institute work this winter, and also last winter, we occasionally ran across oats which had every indication of being wild. Some of the farmers declare that these are not wild oats. We claim that all wild oats are not black, and that all black oats are not wild. I ran across a farmer who said he had seen the wild oat and the tame oat growing on the same stem. Of course when he said that he had seen them I stopped talking, although I had my doubts. Is it possible for oats standing in a field side by side to cross-fertilize and grow both tame and wild oats on the same stem?

Prof. ZAVITZ.—I quite agree with the statement just made that all wild oats are not black and that all black oats are not wild. There are both white and black wild oats as well as white and black oats of the cultivated varieties. Oats are naturally self-fertilized. At the Agricultural College at Guelph, we have grown different varieties of oats side by side for twenty years and they still reproduce comparatively true to type, but the varieties of corn grown under similar conditions for only one year become mixed, owing to the fact that the corn naturally cross-fertilizes. If tame oats and wild oats are grown together, I consider that they would not become cross-fertilized except in very exceptional instances. Even if they did cross-fertilize we would not expect to find two distinct and separate types of oat grains on the same head.

Dr. ROBERTSON.—I do not see very much to admire in this sample of hybrid oats exhibited. That is my fault. Mr. Zavitz did not lend me his eyes with which to look at it. I have seen babies' faces that to me were not pretty, but the mother kept the baby's picture on her desk and in her heart. She saw what I could not. In that baby she discerns everything, from a Messiah to a Florence Nightingale. The evidence of things not seen, the substance of things hoped for. When a man serves his race, he fights the good fight of faith. That is Mr. Zavitz's business also; and good seed is part of the armour.

## HYBRIDIZING THE GLADIOLUS—ARE ITS LESSONS POSSIBLE OF GENERAL APPLICATION.

(Mr. H. H. Groff, Simcoe, Ont.)

It is difficult to realize the seriousness and importance of the undeniable fact, that the most exacting of human interests, the problem of actual sustenance of human life upon this planet, has been forced upon our consideration during so brief a period as the present decade, and indeed it is within the past few years that the startling warning of statistical computation comes to us with shocking forcefulness.

The United States Department of Agriculture tells us, that within another twenty years of existing conditions, that great country will cease to be an exporter of natural products, excepting cotton, and our own department reports, that during the past five years our exports of dairy products have decreased over seventy millions of pounds.

We know that in every community those by-products of agriculture, eggs and poultry, have advanced by leaps and bounds to prices that are almost prohibitive, and that in rank of importance they now lead dairy production for domestic needs, with practically no surplus for export.



Let us pause in brief contemplation of such a condition, when the starving populations of the old world, so called (for Canada is the oldest land on earth), commence to pour by millions into this land of promise, the greatest and last West, driven to this continent by our inability to continue feeding them at home.

From the foregoing threatening array of facts and figures, and from the appalling possibilities that they convey to human life, is it to be wondered that our interest centres on so minute an object as a seed, which with its microscopic characters is to-day of the most important interest to mankind, and we are justified in our insistence on the importance of our contention, for on this interest all future progress in plant life depends, to say nothing of human life itself.

With the enormously increasing production of gold and silver and their consequent depreciation in purchasing power, with the great effort to meet the demands for increased transportation facilities, and with the stimulated activities of manufactures and mechanic arts, and consequent grouping of population, comes the insistent demand not only for more seed, but for more from the seed, as agricultural production is the base of all other physical undertaking.

It therefore becomes imperative that by scientific practice and intensive cultivation, we push the production of existing types to their limit and that by careful selection of seed we increase this production to abnormal proportions, and before these means fail, as they ultimately will, we must constantly and persistently produce newer and more productive types that will give manifold increased yields on the existing and increasing areas under cultivation. Do not think that these world areas of suitable soil are already limited; happily this is not yet the case, but that such are not producing what they will and must is also a fact, and this is the condition that we now desire to serve.

I have spoken of the point of our interest being a single seed, and have given that point a position of great importance, which is amply justified by the fact that any and all progress must begin with that minute organism containing those two associated germs that carry the important characters necessary to give each plant the individuality that differentiates it from any other, and especially in the case of our interest, that differentiation not only desired by us, but which becomes absolutely imperative that we obtain, when the lives of earth's teeming millions are at stake.

My meaning will be clearer when you understand that every variation on the lines desired by us must be by and through a new and distinct origination, either by the uncertain and unreliable chance of natural crossing by wind or insects, or by the more certain and more creditable means of scientific cross-breeding and hybridization, through highly trained human intelligence.

The chief objection to natural crossing is the fact that the ratio of value so produced is relatively small, and that those results of value obtained, carry with them no lesson by means of which the scientific breeder may advance in knowledge and material until he has secured a mass of foundation stock carrying those characteristics that he wishes to transmit in special association, but also that valuable experience which will fit him to quickly form conclusions during the short season available, to enable the production of a profitable ratio of practical results on desired lines.

You will note that I have said desired lines, for the reason that to attain any definite result we must know what we are working with and what we may hope to obtain. You will appreciate my emphasis when I explain that in my work of the past twenty years on one plant, I have long since ceased to generalize, and that my specialty has become specialized to a degree.

It is therefore not possible for me to say more to another specialist for his guidance, than to illustrate through general experiences on comparative lines. In fact there is little to say, but much to think about, and boundless results can only follow unlimited effort.

If you, as a worker on flowers, fruit, cereals or any department of inanimate life, ask me what you may hope to attain, I will say promptly, everything and more.



Surely, this is enough to give incentive to man's immortal craving for advancement—and it is true. When I say everything, it means that you can secure those advanced ideals acquired in the practical pursuit of your specialty, and those ideals will advance year by year as the possibilities of your successful effort unfold before your progressing intelligence. Let me quote in warning, however, that eminent artist, Leonardo da Vinci, 'Do not think that all who have eyes can see. It is only the eyes gained by knowledge that can see.'

But I have said, everything and more, for the reason that having advanced on lines of yearly increasing knowledge, and having made every effort to provide yourself with all available material from every possible source, for infusion in congenial association, your progress will become more attractive and surprisingly erratic as unexpected mutations appear, of character, beauty and usefulness, beyond the conception of the human mind.

These striking mutations, carrying special and valued variations, are to be acquired by the intercrossing of highly advanced specific types with similar types having for their parentage species of a distinct character. If the material used for this work be of too brief removal from the species, the result will be the production of valueless types, or at best botanical curios.

On the other hand, if you have been diligent and successful in building up a suitable breeding stock from all available material, and relieved this material from the pressure of those restrictive specific influences that in nature have moulded each form into its existing character, you will have secured a product of such necessary and desired flexibility as to make association possible with the advanced progeny of other specific types.

The effect of this modification of specific influences by scientific hybridization, is to release those older bonds and influences that predate in their action the conditions that led to the production of species, and unknown and unexpected forces peculiar to the natural order, appear, not simply as natural curiosities and freaks, but of attractive and novel form and habit, with added beauty, quality and value of the most satisfying character, as a tribute to scientific achievement.

I do not mean that my gladioli are a collection of abnormal types, although I have many such of most interesting form, but that they are not bred on lines of racial character according to the practice of European breeders, from whose work the commercial stocks of this country have come. Such breeders have followed closely the production of purely specific types, the effect of which is to limit such to the chief characteristic of each species, and also to curtail their adaptability to generally successful cultivation.

My object has been to produce attractive flowers on strong plants of good reproductive powers, by means of suitable infusions that would give these desired results, and at the same time to modify their specific environmental tendencies, to render them adaptable to changed conditions of soil and climate. As evidence of the correctness of this practice, I quote from the London, England, 'Field,' of September, 1908: 'Not only has Mr. Groff added to the quality and variety of the flower, but he has also given the plants a constitutional vigour that makes their cultivation easy. He has also reduced their cost to one-tenth of that of a few years ago.'

It would not be possible on an occasion like this to do more than generalize on a subject of such great possibilities as plant improvement, nor is it necessary to enter into the detail of those principles affecting this aspect of our interest.

The work of government experimentalists in Canada and the United States has become historic, and the records of the American Breeders' Association during the past five years of its existence afford ample justification for its organization, which is open to all. But with all that has been done it is only a beginning, for the field is boundless in its possibilities and needs.

When you consider that in the item of corn alone, it is desirable that there should be at least one breeder in every township, you will understand how far we are from perfect practice, and this, too, when the work of this one breeder can be con-

fined to improvement by selection only of existing varieties best suited to his own section, and not to the origination of new types.

The costliest material that the agriculturist can use is unsuitable and inferior seed—it is dear as a gift. All present stability and future progress depend upon the seed, the first must be maintained by selection and the second by select breeding. There is no other way. Application of known methods and material is the only means of acquirement, and the sum of results is only limited by the amount of labour bestowed. How simple a process and how easy a way. The need is on every hand and the work most enticing and attractive to the progressive mind, its solution is in the hands of young men of inquisitive and inventive temperament, and the field is the world.

If it has been possible for me, an unknown and untrained man, living in an obscure town and in a country of slandered climate, to bring a semi-tropical plant to Canada, and by means of my primary work secure the publicity and recognition that this work has earned, the opportunity is open to all—and it must be easy.

Let me tell you how I did it. The first years of my experience discovered the unsatisfactory condition of the gladiolus in America, Great Britain and Europe, where over one hundred years had been spent on its improvement.

After costly proving of existing varieties, securing all possible wild types from botanical collections in Europe and from botanical explorers in Africa (Africa being the best original source in the world), I proceeded to supply the needs of both plant and market by the infusion of lacking characteristics through breeding—no natural fertilization and no pedigree system, but by a definite course of practical work designed for the production of desired results, and that on lines at variance with existing theory and practice. Results—the standard by which man's work is judged—have proved my early conclusions to be correct, I hoped so then, when it took from three to five years to mature the first and each year's work; I know so now.

When investigating the condition in the United States, it was proposed to reduce existing stocks by not harvesting them, and thereby stimulate trade. How like the commercial grower! I said then that their trash was not fit to plant, and I would not accept acres of it as a gift and agree to grow it. So I came home with plans to transfer the centre of quality on this continent to Simcoe, by ten years of seed production, and it is there to-day, with some overflow to Great Britain, Europe and Australasia—the triumph of an idea, without professional or departmental aid, or grants from the Carnegie institution. Surely it must be easy.

It will be interesting to record here some striking experiences of scientific interest.

An old type, after years of multiplication and apparent fixity, sported from its scarlet body colour to cerise in two seasons, the first included the upper petal and the upper half of each lateral petal, the second completed the process. All special markings remained as in the original, and the variant became a fixed, new type, multiplying true and transmitting its acquired character in crossing.

This instance is more remarkable from the fact that the vital forces normally tend to the vertical rather than horizontal, in proof of which I have noted the independent opening of flowers on each side of the spike, and also the production of red on one side and white on the other of the same spike, the corm dividing at maturity and thus accommodating the two varieties as distinct individuals.

Atavistic tendencies have given me a series that I have classed as 'Evolution.' Not only do these varieties carry a vine-like tendency of the spike to twist and twine, but many of the flowers resemble the form of the *Iris Kaempferii*, a plant of the same natural order. A vase of these spikes gives a decoration two feet in diameter of novel and pleasing effect.

The influence of discontinuous variation in the increase of the petaline element, has also given me examples of twinning from single seeds bred from semi-double flowers. This unique experience proved of great interest to Prof. Bateson, of Cam-



bridge, England, a prominent modern biologist, on the occasion of our meeting at the International Plant Breeders' Conference, New York, 1902.

To close the case for my system of breeding, a few practical experiences will be in order.

My work is now recognized as the leading quality on this continent, my United States' representative growing 100 acres, the largest area of high quality in the world, with storage for over 40,000 bushels. He exports to Europe over half a million of corms annually; and my Canadian representatives have found difficulty in meeting the demands made upon them for years.

The need for light colours was the first practical demand made upon my system of breeding. I have met it for this continent, and in doing so succeeded in producing from complex parentage bred from species of other colours, the high ratios of 95 per cent true to the desired colours, with 75 per cent in quality worthy of retention, and this in thousands of varieties.

My bluish hybrids were the first offered in the world in thousands of varieties, and during the past year they received high commendation from the Royal Botanic Gardens, Kew, England, as also did a new series of high class yellow shades recently introduced by me, which will fix the world's commercial standard for many years to come. These, too, in thousands of varieties produced in the same ratios of true colour as the light section already referred to.

The recent introduction of a new series of dark colours has met with the most gratifying reports from the world's growers, and these will ultimately displace all existing types, even those of my own earlier production.

The foregoing report covering the range of primary colours in great diversity, closes my evidence as to the practical possibility of breeding for a definite objective—and getting it. The material for such work as the bluish section, is not found in this colour among the species, as are red, white and yellow, but it is the product of scientific breeding only, a fact which brings us back to that most valuable influence in animate or inanimate life—the seed.

As the above statements refer specially to the first half of my twenty years' work, before I close this rather disjointed address, you will naturally expect me to speak of the last ten.

That it has not been necessary for me to continue my free system of dissemination of original seedlings is further evidence of the effectiveness of my practice in breeding, but I regret to add that owing to the piracies of base commercialism, I have been compelled to reserve my later originations for selection, in self defence. Selections from all these newer sections have recently been prepared for introduction, however, in thousands of varieties of such quality as will protect my name and work for this generation at least.

In addition to these, I have a registered and numbered collection of some seventeen hundred varieties, for which I claim the greatest beauty, quality and diversity of colouring, in the whole range of modern floricultural development.

The variety named 'America' by its purchaser and introducer was sold by me in collections for many years before its last merited publicity. It was used for the decoration of President Roosevelt's yacht 'Mayflower,' during the Japanese-Russia peace conference, a tribute to Canada which I much appreciate.

I have stated that Africa has given us the most useful species in the world on which to build our work of improvement, although they are weeds when compared with their Canadian offspring. It has been my privilege to send many of my new hybrids to the Dark Continent, and this return of advanced types to the original habitat of their race gives an interesting example of the romance of modern progress, and the revolutionizing influence of good seed.

Mr. WHYTE.—In referring to the spike being part red and part white, did this peculiarity appear only once, or did it persist?



**Mr. GROFF.**—It was rather an inferior type, and I did not pursue it further, knowing that the peculiarity would not be permanent. The matter of productiveness which was mentioned is the result of breeding. A friend of mine in the middle south of the United States said he never saw the cornels produced before purchasing my hybrids. That shows the value of my system of breeding in transmitting the revitalizing influence. We used to say, many years ago, that my hybrids were revitalized. My American representative said to me once: 'We had a bad year two years ago. Many of my plants died.' I said, 'So did mine, but others died too.' 'But I have been telling people,' he said, 'that yours were revitalized.' I said, 'So they are, but I never promised them immortality.' I gave a paper on this question in Toronto, before the convention of the Ontario Horticultural Society, entitled, 'The Physical Disintegration of Tissue, or the Natural Death of Plants.' That matter had never been publicly treated before my article at that convention. It was rather presumptuous of me to put out subject matter of that kind, but my address was copied in the leading papers of the United States and I have been waiting for critical comment from that time, but none has been made. You will see how simple a thing it is when I explain it. Every plant is made up of certain cellular composition, and that composition is the result of crosses which have been infused into that individual plant. Now, our object of course is to produce certain definite results, and not always what nature intended—that strong, vigorous and virile type, the accumulation of cells made up for the purpose of fitting that plant for the struggle for existence. For example, we look among the human family for the best illustration of relative vitality in hybrids. In this segregation of germs, each carrying characteristics which we desire to bring into union in the individual plant, we can not always be sure of that cohesion that will enable the plant to stand climatic changes from year to year, and when the cellular composition begins to break down the whole plant is affected by it. This subject is being investigated at Cornell. During the past year they made a microscopic study of it and I was asked by them to give my views of the situation and prepared this article for them which was read by me in Toronto. It has been a hobby of mine for many years. When I mentioned it first, fifteen years ago, the commercial growers denied it at once. They were afraid they would frighten the amateur buyer if anything like weakness was mentioned. I have thousands of examples showing every possible condition of disintegration.

**Mr. WHYTE.**—I think we have good reason to be proud that we have with us tonight a Canadian who is the greatest man in his line in the whole world. Mr. Groff himself has much reason to be proud that without any special training for horticultural work, and with only the leisure time of a very busy man, he has made a name for himself as a scientific hybridizer that is a household word over the whole horticultural world. I have grown Mr. Groff's hybrids for many years, and find them so superior to the ordinary strains that I am discarding all my old stock. In his remarks he spoke of the productiveness of his hybrids and the reason for it. That is my experience also, as I find them very much more productive, virile and vigorous than anything else I have grown of the older forms, particularly the Gandavensis type. As illustrating the great productiveness of these hybrids, out of some seed I got from Mr. Groff several years ago, one produced a very fine dark red which I liked so much that I propagated it from bulbets and now have about 2,000 corms of that variety, all from this one seed planted about twelve years ago.

I once heard Mr. Groff say to a horticultural audience that the gladiolus was a comparatively unknown flower. I thought at the time that it was an exaggeration, but in visiting our city gardens as a garden judge I saw so many poor strains that I came to the conclusion that Mr. Groff was right and that but few gardeners know it in its best estate. I am told that Mr. Groff has new flowers in his possession that are as much superior to those he has sent out as the ones we have been growing are ahead of the old types. I hope these will be put on the market soon.

**Mr. MACOUN.**—I would like to say how glad we are to have Mr. Groff with us, and I am particularly glad that some of the men of Ottawa should have the oppor-

tunity of seeing him. It seems to me that we have in Ottawa a large number of men who could employ their spare time much better than they do, and I hope that this talk of Mr. Groff's will induce some of them at least to take up the study of the improvement of some one flower. There is as much opportunity to improve other flowers we grow as the gladiolus. I think you had in mind, Mr. President, in mentioning the gardens of Ottawa, the garden belonging to the late John Mather. Mr. Mather was always fond of the highest class of flowers of the best quality. He had in his garden, year after year, some of Mr. Groff's gladioli, and the fact that he had this high quality of flowers gave him a greater number of points than some of the other competitors. The price of food is going up, but we hope that of flowers will go down, so that more of our growers will be able to get Mr. Groff's best productions.

## PAPERS BY DISTRICT REPRESENTATIVES OF THE SEED BRANCH OF THE DOMINION DEPARTMENT OF AGRICULTURE.

### SEED GROWING IN THE MARITIME PROVINCES.

*By S. J. Moore, Representative of the Seed Branch for the Maritime Provinces.*

The past season (1909) has been one of encouragement for the members of the Canadian Seed Growers' Association in the maritime provinces. Of the eighty-seven names on the list, I found that forty-seven were either doing good work or had made a good start. In two instances applicants had made the mistake of securing impure seed as foundation stock, having purchased from the trade seed supposed to be of one variety, but which was afterwards found to contain several varieties. My advice to them was not to attempt to select from such grain, but to procure for the coming year pure seed from an operating member of the Canadian Seed Growers' Association.

With the assistance of Mr. T. G. Raynor, who was in Prince Edward Island judging in the competitions in standing fields of grain, and Mr. E. S. Archibald, Nova Scotia Agricultural College, Truro, who was employed in the same work, I was able to have every man visited with the exception of two. As I visited personally ninety per cent of the members, I am in a position to say that I have seen more improvement in the past season than in the two previous seasons combined. The value of the hand-selected seed plot as an educator is clearly evident. The operating members are becoming more expert in this work year by year and are able to select heads from the proper type of plant more quickly than when they first began. I am convinced, after three years' experience in inspection work, that there is a great future for the association in bringing about a great improvement in the field crops of Canada generally. That there has been improvement, no one can deny. This may not be due wholly to the selection of seed, but, in part, to better methods of cultivation. I have in mind an improved seed plot of six acres which scored nearly perfect and, although sown with exceptionally good seed, would not have been the success it was had it not been for the extra good condition of the soil. This was a fall fallow, ploughed in the latter part of August and well cultivated until late in the autumn, thus germinating and killing many weed seeds and leaving a fine clean seed bed for the coming spring.

I mention here that the wheat plots of several of our members escaped injury from the joint worm by sowing late, not earlier than June 1. On the other hand, some of this late sown wheat was affected with rust owing to late ripening, the past warm, moist season being favourable to the development of this disease. In ordinary good seasons there would seem to be little damage from this source.



During the past summer we had competitions in standing fields of seed grain in all three of the maritime provinces. In Prince Edward Island there was a competition in each of the three counties in wheat, oats and barley and an increase in the entries in wheat and oats. The entries in barley were few in number, this crop not being very extensively grown in the province. From the report of the judges and from personal observation I would say the quality of the fields entered was much above that of last year. In Nova Scotia we had seven competitions in oats, good seed oats being in greater demand and much more difficult to procure than wheat or barley. The entries in the these competitions were not so numerous as we would like to see, yet were sufficient to awaken an interest among the farmers, and warrant their continuance this year. Already there are inquiries from a large number of farmers for seed good enough and pure enough to sow a field to enter in these competitions.

The Northumberland County Agricultural Society of New Brunswick had the largest competition in the maritime provinces, having seventeen entries in wheat and twenty-two in oats. The very generous prizes offered by this society had much to do with the number of entries. The society put up the prize money without any promise of assistance from the provincial department, but I believe were suitably rewarded later. We want more societies like this in the provinces.

A noticeable feature of the competitions was the prominent place taken by the members of the Canadian Seed Growers' Association and those using seed from them, and the frequent complaint by the judges as to the general impurity of the fields sown with seed from other sources. While these competitions may not result in the immediate production of large quantities of good seed grain, yet the educational value of having such men as Mr. Innes and Mr. Raynor, and others I might mention, going among the farmers scoring their fields of grain, pointing out their defects and advising them, cannot be computed in figures. Quite a large percentage of the farmers of New Brunswick and Nova Scotia depend on the trade for their annual supply of seed oats. As it is quite well known that it is almost impossible at the present time to purchase any large quantity of clean seed oats, true to name, we can readily see the necessity of using some means to encourage these farmers to produce their own seed grain. Hence the necessity of some such organization as the Canadian Seed Growers' Association as a source of supply for such seed. As every farmer cannot become an expert breeder of seed grain any more than every farmer can become an expert breeder of pure bred live stock, it is not likely that a large number will become operating members of the Canadian Seed Growers' Association. Almost every farmer can, however, set aside an acre or two of his cleanest and best land for the production of his seed for the coming year, which is a much better practice than taking it indiscriminately from the grain bin, or buying it from the trade.

For the encouragement of maritime members I would say that on the experimental plots at Nova Scotia Agricultural College, Truro, last year, seed procured from members of the Canadian Seed Growers' Association gave the highest yield in both white and black oats. This is only one year's experiment, but as Mr. Archibald is devoting a large part of his time and his best ability to this work, we expect these experiments, in the near future, to be of great benefit to the farmers of the maritime provinces.

It seems to me the price paid in the past for registered seed is not sufficiently remunerative for the time and skill devoted to the production of it. Any reliable seedsmen can introduce a new variety of oats and obtain prices ranging from \$1.50 to \$3 per bushel according to the quantities purchased. The registered grain produced by our operating members is likely to be more valuable than the majority of this much advertised seed.

During the past season your secretary, Mr. Newman, supplied three of our members with sufficient oats to sow a quarter acre of Regenerated Abundance at the rate of two bushels per acre, one quarter acre at the rate of four bushels per acre,

and one-quarter acre of Banner at two bushels per acre. This experiment was in the hands of one of our best members in each of the three maritime provinces.

On inspecting the plots I found the Abundance sown at the rate of two bushels per acre a failure and that sown at the rate of four bushels per acre not equal in yield to the Banner sown at the rate of two bushels per acre, besides lacking in strength of straw and, in one instance, where there was slight rust, more susceptible to rust.

We have held the usual number of seed fairs in the maritime provinces during the past year, with a gratifying increase in the number of entries and a great improvement in quality of seed. One very encouraging feature of all the fairs was the large increase in amount sold during exhibitions. The Provincial Seed Fair, held at Summerside in March, showed a large increase in the numbers of exhibits, as well as an increased attendance and interest among the farmers. The seed exhibit in connection with the Maritime Winter Fair at Amherst was the best yet, especially in quality. The exhibit by members of the Canadian Seed Growers' Association took about one-third more space than it did last year, and although the management of the fair placed at our disposal more and better space than ever before, yet we did not have a foot to spare. Had not some of our best members been prevented from exhibiting owing to bad harvest weather, the space would not have been sufficient.

I will conclude by impressing on our members the importance of thoroughly grading their grain, supplying their customers with nothing except what they would consider first-class seed and charging a paying price for their goods.

#### SEED GROWING IN QUEBEC.

*By J. C. Coté, Representative of the Seed Branch for the Province of Quebec.*

I had the pleasure of visiting last year some of the members of the Canadian Seed Growers' Association in the province of Quebec. Although the number has not increased appreciably, their work is progressing satisfactorily. Last season was a favourable one in Quebec; the yields were above the average in many cases, but rust was prevalent in many districts and the grain of some of the members suffered considerably from it.

Any one not visiting the members of your association in the district of which I have charge might think that little is being done in the way of improvement; but by closely observing the work of these men year after year, I am convinced that much has been and will be accomplished in improving the crops. The great drawback in selecting grain is that the work has been ignored too long by the farming community. This is what I have realized in visiting the members of the Canadian Seed Growers' Association and in organizing seed fairs and field competitions. I must confess that when I started this work I was discouraged many times, but the interest aroused among the farmers during the past year has surpassed all anticipation. There was grain exhibited in the fields and in the seed fairs last year that was almost perfect. Once the farmers see that their neighbours can accomplish such things, they readily set to work to see what they can do.

We know that the majority of farmers are far from being seed grain experts; therefore to serve the purpose of your association, nothing should be spared to give your members object lessons on the art of grain growing and seed selection. Good seed grain is the outcome of good selection and good cultivation.

#### SEED GROWING IN ONTARIO.

*By T. G. Raynor, B.S.A., Representative of the Seed Branch for the Province of Ontario.*

In connection with our work in the province of Ontario, I believe we can report progress. The visits I made last summer did not cover all our field, as our secretary divided the work with me. My visits were to men growing oats, barley and wheat,



We visited about thirty such fields. We have some good men and some better men and, possibly, as the work of the association goes on, we shall have to use Prof. Dean's aphorism for the improvement of the dairy herd, 'It is necessary to breed, feed and weed.' I am satisfied that the process of improving seed will be a process of elimination. I believe that fully half the breeders in oats are doing excellent work. The other half are doing more or less fair work. There are some drawbacks and some of them have been mentioned. Many have applied in the last five years to become members who have not qualified and are dropping out. Some commenced in the Macdonald-Robertson seed competition nine years ago, and have dropped out. We find that some of the men who started as early as 1900, and who are not now members, took up a variety which did not prove a popular one, and, finding they could not get a market, they dropped out. One of the most important things, as Prof. Macoun suggested, is that suitable varieties should be emphasized. Experiment stations are doing good work along that line. Wholesale seedsmen advance certain special seeds and advertise them largely. By the time these special grades get into the hands of the farmers, they have frequently changed their names, one variety has become multiplied into several and the farmers get confused with the names. Some of our seedsmen brought out a carload of one kind of oats from Chicago. Four seedsmen participated in these oats and sent them out under four different names. There is a difficulty in recommending varieties satisfactory to the locality. The chief drawback to this work is the time of year the farmer must select his plants, the increased cost of labour and the difficulty of getting skilled labour. There are so many other things pressing on his attention that he fails to do the work. I believe the special clause adopted by this association will largely overcome this drawback. There are some splendid encouragements. I know men who are profiting from their membership and work in improving seeds. One man with oats who has been producing registered seed for the last three years, with the free advertising from the association, gets \$1.25 for all the oats he produces up to a proper standard. He is interesting some of his neighbours in that variety of oats and will have a larger supply. In the main, however, our members have not had sufficient monetary advantage. If something could be done to enlarge their interest, I believe that would safeguard us against losing many members. Mr. Moore suggested that if the breeders of these plots would put a larger price upon the seed, it might create a greater enthusiasm and interest, but I am not prepared to go that far. I believe that if the farmers who are improving their crops in that way would put a moderate price on their seed, of course in advance of ordinary commercial values, it would create a market for it and would put it within the reach of every farmer. The seedsman can command a higher price than the farmer. We should not only improve the seed by careful hand selection, but we should follow that up by a first-class fanning mill selection. That is one branch we have been attempting to emphasize. Hand in hand with plant improvement we should have a good fanning mill selection. If we get all the large plump seeds separated and send them to our customer, he will come back for more. Those men who are in real earnest, who love the business in itself, become enthusiastic about it. Mr. Gies, who has improved Dawson's Golden Chaff, a white winter wheat, averaged over 47 bushels per acre over 13 acres. He attributes that larger yield to the selection of his plants and to the use of his breeding plots. He told me he found in the selection of a certain head of wheat a number of spikelets that had five seeds. It is possible to have five seeds in a spikelet of wheat, but as a rule you will find only three seeds. He also discovered a few heads with four seeds in some of the spikelets. He said he sowed them in a place by themselves, and the larger number were producing spikelets of four seeds. He did not keep the five-seeded wheat head separate. At the time he saw it, he was not so alive to the importance of isolating such seeds and plants. That goes to show the possibility of multiplying the yield per acre of our farm crops. We can see a great future for this work at our fairs. I know of no part of this country better adapted to the production of

high class seed, where they can keep it free from mixtures, than Prince Edward Island, and perhaps the other maritime provinces. There nearly every man owns his own threshing outfit. He can prevent in a large measure the mixture of his grain, and that is a difficulty we have here in Ontario. The threshing outfit in Ontario is a movable one, and the farmers have not room to keep the different varieties of grain separate. They feel they cannot take the time to thresh it with the flail or with horses, and the grain gets mixed. Some of our members have been selling such mixed seed, and complaint has been made to me that the seed was not altogether pure. If we can induce our seed growers to keep the seed pure, that will go a long way to increase its value. We are getting a large number of applicants through solicitations at seed fairs and at short courses in seed and stock judging. In Ontario we have greater facilities for interesting the farmers than we have in the other provinces, as the district representatives of agriculture, who are agricultural encyclopedias, say a good word for the production of good seed. We expect to increase our membership. We know from our winter fairs that progress has been made in the purity of seeds; they are freer from mixtures and from weed seeds. In the field crop competition class at Guelph, where 107 lots were on exhibition, the purity was most marked as compared with the year before. Here in Ottawa, where there were 45 entries in the oat competition class, the same improvement over last year was noticed. At the fairs I had an opportunity of visiting I saw the same general improvement. I believe this is in a measure due to the educational propaganda of the association.

#### SEED GROWING IN ALBERTA AND BRITISH COLUMBIA.

*By W. C. McKillican, B.S.A., Representative of the Seed Branch for Alberta and British Columbia.*

I am glad to be able to report a substantial increase in the number of members in this district this year. The secretary's report will show this increase more definitely. Not only has there been an increase in members, but also in interest, recognition and enthusiasm.

The recognition by the association of the product of plant breeders such as Dr. C. E. Saunders will give a great impetus to the growth of the association in this district. Our farmers rely largely on the experimental farms for their start in seed growing, and it will be much more encouraging to be able to register this seed from the start.

The chief difficulty in the way of greater advancement in this district is the scarcity of labour at harvest time. The farmer is so rushed with the regular duties of the farm, that it is only with the greatest determination that he can take the time to make the proper hand selection. The former apathy toward seed improvement has largely disappeared, and in its place has come a keen appreciation of the value of pure seed and a willingness to pay for it, if only some one else will do the work of producing it.

The growing of pure seed as a business is now being taken up by a number of the best farmers in Alberta. They have not had time yet to produce any great quantity, but in the course of a few years some of the best producing members of the association will be residents of Alberta.



SOME EXPERIENCES IN CROP RAISING WITH SPECIAL REFERENCE  
TO THE POTATO.*(Mr. W. H. Taylor, St. Giles, Que.)*

As a member of the Canadian Seed Growers' Association, I feel that the names implies a mutuality of interests and sentiments, *i.e.*, that each member should consider as common property whatever light he may have gained in agricultural pursuits. In this light I have accepted the invitation of our secretary to contribute a paper for the annual meeting.

We read a great deal just now about hereditary influence, evolution and regeneration. While I am cognizant of the enormous power of the first and of the basis of truth to be found in the second and last ideas, yet I am far from accepting the conclusions of most of their advocates in their entirety, for in these conclusions we find most serious obstacles to the realization of the ends of our association. Owing to circumstances over which I had no control, I have been able to devote but few hours to study other than the study of plant life and soil culture, a passion for which I inherited from my mother, a native of the county of Kent (the garden of England).

I received my first and best instructions from a gardener at the age of seven years—he who succeeds in raising first-class vegetables will succeed in all other crops. At fourteen we emigrated, settling in Melbourne, Eastern Townships. There I was in my element, although working with the hoe among roots and stones was a different job to digging and raking in a garden at Chelsea. Leaving home, marrying and bringing up a family obliged me to take up other and more profitable work for a number of years, but I kept alive my interest in plant life by means of study and cultivating whatever land I could obtain in the shape of a kitchen garden, until 31 years ago when I bought a farm in St. Giles, Que. Being convinced from what I had seen in England and on the best cultivated farms here in Canada, from reading of successful farming in Scotland, Germany, the United States and other countries, that hoed crops, especially root crops, were the foundation of successful agriculture, I applied myself to this branch more particularly, and as potatoes formed a great part of our own food they naturally obtained the most attention. Potatoes having been for the last fifty years very liable to disease, our first experience being the loss of our entire crop of 200 bushels, my first care was to procure seed not liable to disease. Experience gained in another line led me to the conclusion that while life is manifestly in an infinity of forms, it is in all created things essentially the same. It follows that what is conducive to health and strength in animal life shall be, under necessary modifications, conducive to vegetable life and vice versa. Accepting the theories of hereditary influence and evolution so far as to believe that all animal and vegetable life (perhaps mineral also) contains a germ capable of being developed and improved to an extent not yet conceived of, liable also to become disordered and diseased, I made use of my knowledge of animal life to prevent if possible my potatoes from becoming diseased.

Solar light and heat being acknowledged to be inimical to microbe life, I commenced by planting wide apart; I gained something in this way, not enough. Knowing that fermentation in the stomach causes indigestion and consequent weakness in the human, I tried to diminish fermentation on the soil by spreading my manure broadcast instead of in drills before planting my potatoes. Next finding that my neighbours harvested very small and badly diseased crops and that they hilled up very high, and believing that they injured the roots and consequently diminished the vitality of the plant, I planted on the level and maintained the soil in this condition, as far as frequent cultivation permitted. At the same time, to ensure as much vitality as pos-

sible, I planted whole tubers. Taking advantage of the principle of hereditary influence I gathered my seed in the fall, rejecting every tuber from every hill in which there was a single diseased one. The result was such as I could logically expect, a very marked improvement being soon apparent. I commenced with the Snowball procured about 15 years ago from some seed house in the United States which I cannot recall, a very handsome potato but very liable to rot. It is now almost immune—less than one one-hundredth of one per cent being diseased. It has, however, become too large for table use, and I am now selecting much smaller seed in order to bring it to a more suitable size for the market.

All vegetable life must, to be of the greatest vitality, be entirely free to act according to its nature and requirements, therefore, the soil must never tighten around the stems or roots. This requires not only frequent cultivation during growth but thorough preparation of the soil before planting. Now, how do I carry out in practice my theory? Supposing, as is the case on the land I cultivate, that we have too much land to look after and, unfortunately for the sake of good farming, too much time spent in pulp wood preparation to plough as often as we should. I take a crop of oats on first breaking the sod, after which I manure lightly and take a crop of buckwheat; the next spring (the third) we spread what manure we can afford broadcast, plough it in and harrow down as well as possible, then make holes with a hoe (we never plant more than 8 or 9 bushels), and cover lightly to ensure against frost and sunburn. As soon as visible I go through with a cultivator and continue cultivating as often as weeds or rain make this necessary. In the fall I dig my potatoes by hand and choose my seed right in the field; rejecting all hills in which even a single diseased tuber can be found.

The distance between rows and between seed in the row varies according to variety. Mr. Taylor's improved Snowball and Sensation require about 30 inches between rows and 15 inches on the row. Early Rose and Early Harvest do not require so much, say 24 inches and 12 inches. You naturally want to know why I sow buckwheat before potatoes. There are several reasons: first, buckwheat will smother or greatly weaken almost any weed and will reduce the most stubborn soil to friability; second, it shells out a great deal in harvesting, springing up the next spring, forcing me to cultivate when perhaps I might not otherwise do so, and its roots and stems serve to keep the soil open to the influence of rain and sun so that it never bakes.

Let me say here that for the last three years that I have been a member of this association, my work has been confined to selecting seed tubers from the plot planted according to the rules of the association. In my opinion two inches in diameter as the minimum size for seed tubers is too large, tending to produce tubers too large for the table. I find it better as regards number of marketable potatoes per acre to use only medium size, say  $1\frac{1}{2}$  to at most  $2\frac{1}{2}$  inches in diameter. My report the past season shows a yield of nearly 500 bushels to the acre, with almost no rot.

Mr. MACOUN.—I never miss an opportunity of saying something about the potato. When we think that the average yield of potatoes in Ontario for the last 25 years is only 111 bushels per acre, surely this crop is one which this association could give attention to. The possibilities of improvement in the potato—not so much in the seed as in the method of culture—are greater than in any other crop. When we consider that we are getting an average of only 111 bushels per acre and the possibility is 1,000 bushels, I say we should give greater attention in this country to the culture of this crop. In Great Britain and Ireland they are getting twice the average yield per acre that we are in Ontario, and our soil is probably at least as good as it is there. There is no doubt a good deal in the climate. In regard to the blight resistance of potatoes, I have observed during the last twenty years or so that the later varieties, taken as a whole, are less subject to blight than are the earlier ones. The best blight-resisting varieties on the market are late or medium late ones, and I believe that the reason for that is that when the critical time in the summer comes and the conditions are favourable to the development of disease, these later varieties



are not so weakened by the production of tubers as are the earlier sorts. Therefore, I would suggest that in planting potatoes, plant early varieties as early as possible. The later varieties may be planted last, say about the latter part of May. By planting the early varieties early, you get the crop developed before the blight comes; and by planting the late ones late, there is not so much danger, since the blight season is pretty well over before the plant reaches the maturing stage. We have been selecting for blight resistance now for five years, starting with the varieties we found freest from blight during the past fifteen years. We kept a record during that time and have found quite a marked improvement in the resistance to blight, but have not had the opportunity of noting the comparative resistance to rot, as we have little rot in our soil. The yield is improved, however, and the tops remain green longer than in the kinds we selected from. We do not spray the plants under the test for disease but give them the chance of being affected.

Mr. CLARK.—Early in August of last year I spent several days at the experiment station in Svalöf, Sweden. I spent nearly half a day with Mr. Job Lunberg, who is on the staff with Dr. Nilsson. He told me he had spent about thirty years in the study of the potato crop. He had an armful of willow sticks, and he was sticking these twigs down by the potato tops that came nearest his ideal of perfection. When he came to dig his potatoes, he would first go to those hills where he had put down one of those willow twigs. If the tubers came up to his ideal of perfection, he would take all in the hill for seed. If they did not come up to his ideal of perfection, he would take none of them. He put down the twigs to mark the potatoes that had proven to be disease-resistant. In talking with him, I found him exceedingly careful about what he said. He would repeatedly stop his story and remark that he had yet much to learn. But he did state that he had found in the earlier varieties of potatoes, after they had passed about eight or ten years from the seed proper as distinguished from the tuber, a greater tendency to potato blight. The later varieties, after twelve years removed from the seed, began to lose their vigour and were more susceptible to disease than they had been during the first few years. He showed me two plots of potatoes growing side by side. One was two years removed from the seed; the other was the mother crop, about twenty years removed from the seed. He had not treated them with Bordeaux mixture at all. He had left them to become diseased. The old crop was badly affected with blight, which is common in Sweden; the new crop, two years removed from the seed, was vigorous and unaffected by the disease, so far as I could see. After he had explained his opinion to me, he said that it was just an opinion of his, which had grown out of his experience; and he spent some minutes qualifying the remarks he had made, and saying how much he had yet to do before he could say definitely whether or not this were true.

Dr. ROBERTSON.—I conversed fifteen years ago with the potato specialist of one of the big places in England for propagating potatoes. There were some 240 odd new varieties under test at Reading. He said to me, 'A variety of potatoes originating from the seed has a life somewhat resembling one of the animals, with a period of maximum usefulness in production.' He put that period in most varieties of potatoes at about twenty years. That was his opinion from experience, not his knowledge. It seems to coincide with the experience of the other man. Of course, there are exceptions; the Early Rose, for instance, is more than 25 years old. My own great grandmother at 96 was able to milk her cows; but most of us do our best work between 25 and 55.

## OPERATIONS ON EXPERIMENTAL PLOTS IN NOVA SCOTIA.

(By E. S. Archibald, B.S.A., Truro, N.S.)

As representing the Agricultural College, Truro, N.S., and in justice to work performed along such lines by our local government, I would like briefly to outline experimental work in Nova Scotia for the past year and prospects for the future. As a province we realize the need of agricultural advancement in every branch. Probably the greatest need is agricultural education, and I assure you that the work of the Canadian Seed Growers' Association is very materially aiding us in the solution of this problem. Not in the advancement of seed interests alone, but also in other matters is this association demonstrating the advantages of modern farm practices, such as shorter rotation of crops, superior tillage, the handling of fertilizers and allied problems.

The question of drainage is extremely important with us, and the action of the Nova Scotia government along this line, might come under the category of experiments. We have purchased a drainage machine and propose for the coming year to survey and dig drains for farmers, at nominal prices, in order to stimulate this much needed operation. There is also proposed a loan to farmers who desire underdrainage, yet who cannot find ready cash for the same. This as yet has not materialized, but in general outline is similar to that of the Ontario government, and promises well.

All these problems must be considered in order to form a solid foundation and secure maximum returns from such branches as seed improvement. The interest taken in crop improvement is growing rapidly. To illustrate: At the short course of 1906, the seed classes were poorly attended, while in the past two years, they were the most popular of all classes, live stock included. This growing interest is due largely to the stimulus given by the Canadian Seed Growers' Association, together with aid received from the Ontario Agricultural College, Macdonald College and the Central Experimental Farm, Ottawa. I would like to call particular attention to our maritime seed inspector, Mr. S. J. Moore, who in his routine of seed inspection, as well as at seed fairs, farmers' meetings, &c., has had a marked influence on the rapid progress of seed improvement in Nova Scotia.

As there was a strong demand from our farmers for greater attention to variety tests, registered seed, fertilizer tests, and the like, our department deemed it advisable to carry on experiments on a larger scale. In the year 1909, I was given charge of this work. The results, even in one year, bring out many interesting and valuable facts. In the eighteen varieties of oats tested in one-hundredth acre plots, the leading variety was the Early Blossom, which yielded over 64 bushels to the acre. The seed of this was registered and obtained from Mr. Donald Innes, Tobique River, N.B., who is a very prominent worker in the Canadian Seed Growers' Association. The variety standing third in this list was the Black Tartarian, at 45½ bushels per acre; this seed also being from a member of the Canadian Seed Growers' Association. In fact the seven leading varieties were all from seed which had been hand selected for several years. This is certainly a strong recommendation to the farmers in favour of obtaining not only pure seed, but also varieties suitable to their conditions and from hand selected stock. Other experiments made with oats were rates of seeding and continuous selection. Amongst the farmers of our province, there is a wide variation in rates of seeding of oats, varying from 2 to 6 bushels per acre. Although the season of 1909 was not advantageous for the stooling of oats, yet Banner oats seeded at the rate of 2 bushels per acre gave the heaviest yield, at the same time maturing grain which weighed heavier per bushel, and gave a lower per cent of hull. I would like



to hear the experience of Profs. Zavitz, Klinck and others regarding the relationship between rates of seeding, and date of maturity, weight per bushel, and per cent of hull. These questions of weight per bushel and hull per cent, are comparatively new to our farmers, but they are grasping the importance of the same, and already we can see good results. Mr. Harry Brown, of Wallace Bay, who is a member of the Canadian Seed Growers' Association, has already done considerable valuable work in selecting from his breeding plot of Banner oats, plants which mature earlier, are thinner of hull, and weigh heavy per measured bushel.

We also conducted an experiment regarding the comparative yield of heavy versus light seed, as it came from a first class grain grader and fanner. As a one year's test this was very satisfactory, the yield from the heavy, plump seed averaging six bushels per acre over the others. I have also made a hand selection of Banner oats, sufficient for a quarter acre plot, during the coming year. Our farmers are also very much interested in varieties such as Regenerated Abundance, Regenerated Tartar King and other varieties put out by the Garton Seed Company. We propose testing some of these varieties, in quarter acre plots, during the coming season.

We also tested varieties of barley, with very good success. This is a crop which needs promotion in our province, there being only 10,000 acres during the season of 1909, averaging 23 bushels per acre. The two-rowed varieties are by far the most commonly grown, but I think for the average districts, a good six-rowed variety would give far greater yields. For the past year on plots, the Oderbrucker led with 58 bushels per acre, while our best two-rowed variety, Duckbill, yielded only 42½ bushels.

During the last three months there have been many inquiries regarding mixed grains for seeding purposes. Many farmers are trying mixed barley and oats, with varying results. In order to demonstrate the value of mixtures, we started a series of experiments which caused much interest among visiting farmers. Of all mixtures, the Mandscheuri barley and Daubeney oats gave the greatest yield in bushels and weighed the heaviest per bushel. We are sure that in a short time grain mixtures will receive the attention which they deserve.

Although we realize that Nova Scotia will never compete in corn raising for either ensilage or grain purposes with some other provinces of the Dominion, yet there are districts in this province which can, and eventually will, mature first class ensilage corn. Consequently we are much interested in the subject, and are doing our best to acclimatize the best varieties of early flints. On our plots we tested fifteen strains of corn, with variable results. In quantity of ensilage the Longfellow led with 18½ tons per acre, closely followed by several varieties of dent corns. The Longfellow was in the dough stage when cut, while all dent corns were but forming their ears. The corn which promises best for the maturing of seed, in the Truro district, is Canada Yellow. Three lots of Canada Yellow corn, from different parts of the Annapolis valley, were obtained for seed, and all of these matured fairly good ears. It is interesting to note, that in the second year of maturing Canada Yellow in this district there was a big difference in yield of fodder, and it was about ten days earlier in maturing. Examples similar to this may be cited throughout various parts of our province, and the question of acclimatization, together with yield of fodder, size, uniformity, and the maturing of ears, is becoming widespread through the influence of the Canadian Seed Growers' Association.

However important the raising of corn may be in some districts of our province, root growing will always predominate. In the testing of the varieties of mangels and turnips, seed was procured from various seedsmen in Canada and England. I would like to mention, particularly in the mangel test, the fact that Canadian grown seed, variety, Tankard Ideal, procured from the Ontario Seed Company, Waterloo, Ont., led all varieties, with a yield of 1,020 bushels per acre. In varieties of turnips, there were eight over 1,000 bushels, the best being Hazard's Improved, with a yield of 1,913 bushels.

Variety tests were also made in potatoes, with excellent results. With this latter crop various fungicides and insecticides were also tested. Since Bug Death is sold in such large quantities throughout our province, and with such a diversity of reports from users, I gave this a careful trial, using it in varying quantities, and weighing the crop from each plot. As we had no fungus disease on potatoes this year, I cannot tell its influence along such lines; as an insecticide, however, it was practically worthless, even in comparatively large quantities, and there was no difference in the yield per acre. I realize that this is but a one-year test, and hope that others are having better results with this article.

A large area was also utilized for fertilizer experiments on turnips, mangels, potatoes, grain and other crops. Mr. F. L. Fuller, formerly farm manager, conducted a careful series of experiments along this line, and in repeating his experiments, we have added quite largely to the list, by the use of various fertilizer mixtures. Considering the tremendous quantity of fertilizer which is placed in the hands of our farmers yearly, we consider that an extended and carefully conducted series of experiments in the same to be of vital importance.

These experiments for 1909 have been well followed by all visiting farmers and students attending college. As to the outlook of the experimental department, I might say that it is bright. Probably the first need of the province along this line is an experimental union, and this may easily be obtained through the promotion of this department and the stimulus of the Canadian Seed Growers' Association. We are attempting no plant breeding work as yet, but realize that this field of work must be entered upon within a few years, and we hope that the influence of this department of our college may be an aid to the farmers in Nova Scotia, as have experimental departments of the Ontario Agricultural College and other colleges to their respective provinces or states.

Prof. ZAVITZ.—Mr. Archibald has touched upon a number of points. He spoke of oats and asked something about what we considered the relationship between the thickness of hull, the yield per acre and the weight per bushel, of the different varieties. I might briefly state that there seem to be certain co-relations between these different points in oats. We have found at Guelph, in the study of a large number of varieties, results which I think are somewhat different to the general expectation in regard to oats. We have found that as a rule very many of the varieties of oats—with emphasis on the word 'varieties'—many of the varieties of oats which weigh the most per measured bushel are oats which give a low yield per acre, and which are of a poor quality. Now that is a sweeping statement, and yet we find it true in a great many cases. Take the Early Dawson, the Pioneer, the Tartar King and the Storm King oats, which weigh comparatively heavy and yet are rather light yielders and are thick in the hull; take some other varieties, such as the Daubeney, the Joannette, and the Alaska, and we find that these are oats which are not specially heavy in weight per measured bushel, according to the standard, and yet they yield heavily and are thin in the hull. This is a question to which we should give a good deal of attention, for in Ontario the oat crop amounts to about \$40,000,000 annually. In many cases, those oats which get the prize at the exhibition are oats of poor quality, being thick in the hull, and, in some cases at least, they give comparatively low yields per acre.

Mr. ARCHIBALD.—Another point to which I referred was, what is the relationship between the rates of seeding and the thickness of hull. We used, one season, the Banner oats, and in the same sized plots, with the same soil and the same conditions, we seeded one-half bushel to six bushels per acre. At two bushels per acre we found we had about the smallest percentage of hull. In the six bushels per acre plot, we had the greatest per cent of hull and the smallest weight per measured bushel.

Prof. ZAVITZ.—We have not determined the per cent of hull, although we started an extensive and important experiment last spring in sowing oats at different thicknesses. We hope soon to have some valuable data on this question. Perhaps Prof. Klinck and some of the others would have information on this point.



Prof. KLINCK.—For three years we have been trying to determine the relation, if any, which exists between the rate of seeding and the per cent of hull in oats. So far, our results go to show that the proportion of hull to kernel fluctuates considerably, although it does not always bear a direct relation to the yield.

While our data would not justify us in drawing definite conclusions on this point, we have, almost without exception, observed a striking influence on the length of straw and time of maturity of the various cereals sown at different rates—thickly seeded grains being much shorter in the straw and much earlier in ripening than the thinly seeded ones. This is particularly noticeable in dry years; but even in a season of excessive rainfall the fact is readily observable.

So far as our observations go, per cent of hull seems to be most influenced in a given variety by the degree of maturity attained at the time the oats are cut. In one experiment, oats cut in the early milk stage ran 20 per cent higher in hull than did the normal, and at the same time weighed but 28 pounds per measured bushel.

There is a slight difference in the stooling of oats when sown at the same rate but on different dates. The belief that the later oats are sown the more seed will be required has some foundation in fact, although experiments would indicate that the difference is slight.

Prof. ZAVITZ.—Dr. C. E. Saunders has had much experience in this line. We would like to hear from him.

Dr. SAUNDERS.—I cannot add much to what has been said on this subject. We have not noticed any difference in the date of ripening at Ottawa by increasing the quantity of seed per acre. I think the problem is so intimately associated with the rainfall that any differences observed may often be accounted for in that way. If the rainfall is copious, each plant will have sufficient moisture, even under crowded conditions; but if the rainfall is scanty, the plants will suffer more and will ripen rather prematurely when they are growing in a thick mass. I do not think therefore that we can lay it down as an invariable rule that increased quantity of seed will hasten maturity. Our experiments this season in reference to the stooling of oats quite agree with Prof. Klinck's. The Abundance does not show any less tendency to stool than most of our ordinary varieties.

Mr. WOOLFORD.—Is there a better growth when oats and barley are mixed together?

Mr. ARCHIBALD.—We have found a big increase in the quantity of grain when the two were grown together.

Prof. ZAVITZ.—From different varieties of oats grown together or different varieties of barley grown together, we got no advantage over the average yield of the varieties grown separately, but when we have grown oats and barley together we have had an advantage. We have received on an average a little over 200 pounds of grain per acre more than when grown separately. It is with the object of securing this increase that in Ontario oats and barley are grown together. The mixed grain is threshed and used largely for feeding purposes.

## THE INFLUENCE OF ENVIRONMENT ON THE COMPOSITION OF WHEAT.

(By Frank T. Shutt, M.A., Experimental Farm, Ottawa.)

Your president thought it might be interesting were I to say a few words in regard to the investigation on the influence of climatic conditions on wheat that I brought before you some three years ago, with some account of the results we have obtained since that time. The matter will be presented very briefly. Most of you will doubtless remember that at the annual meeting of this association in 1907, I presented the

first results we had obtained in this investigation, making very clear that profound differences in the protein content of wheat might arise from what we might call climatic influences. The influences which affect the composition of wheat may all, perhaps, be grouped under two heads—heredity and environment. I thought it was the duty of the chemist to look into the environment problem, while possibly heredity might specially belong to the sphere of the biologist, although heredity, like many another biological question, is becoming a chemical study.

To the magnificent prairie soil is usually attributed the high quality of our north-western wheats. It occurred to me, however, that this excellence in quality might be due, in some degree at all events, to climatic conditions during the growing season. The richness of the soil is undoubtedly a factor of no mean importance, but it is one affecting yield rather than quality. Then we found out that there was much dependent on heredity, and that we had in Red Fife a wheat which had in itself a high quality; it is a feature well worth emphasizing—the character of Red Fife is undoubtedly to be attributed to inherited qualities. We, however, have been able to show that the percentage of protein in wheat may be markedly influenced by climatic conditions. This was brought home to us by the fact that the quality of northwestern wheat, as apart from the yield, varies somewhat year by year; that is, the proportion of the various grades is not constant. Again, while the wheat of one district may be very good, that of another may be soft or piebald, implying a smaller percentage of gluten or protein. We learned, for instance, that the wheat in certain districts in northwestern Manitoba is characterized by grain of a more or less piebald nature, indicating starchiness. This grain would have a lower protein content than wheat grown in the Portage la Prairie district, for instance. Wheat taken from Portage la Prairie to northern Manitoba deteriorated, that is, produced wheat which was softer than the parent seed. In certain parts of the Dauphin district, moderately good wheat might be procured, while in another part of that district wheat of a low grade would be obtained. And there is not only in this respect a difference in the districts, but from season to season in the same district. We began our investigation in this matter in 1905, with the co-operation of one of your members. In 1906 we found that wheat on newly broken land contained less protein (gluten) than wheat from land under cultivation for ten years. In 1906 we had samples of those soils sent down during the whole growing season. They were submitted to complete analysis and their moisture content taken at stated intervals. We found that the newly cleared land was rich in humus and nitrogen, but otherwise very similar to land that had been cultivated for ten years. There was, however, a marked difference in the moisture content of these two kinds of land. Whereas throughout the growing season the moisture ran in the neighbourhood of 30 per cent for the newly cleared scrub land, it was only 20 per cent in the cultivated land, a difference of 10 per cent in the moisture content of these two soils. There are reasons why the newly cleared land should contain the larger percentage of water. But we need not now discuss this matter. The point is that there was this marked difference in the moisture content of these two soils. The origin of the soils was the same. They were identical in all probability some years ago. We analyzed the wheats from these two soils and found a difference of almost three per cent in the gluten content. The seed used had been obtained from Portage la Prairie; it was first class wheat, with a high percentage of protein. That grown on the newly cleared land, the moister land, had fallen off most in protein content, while that grown on the cultivated—the drier—land had fallen off least. The experiment was also made with seed produced in the Dauphin district grown on newly cleared land and old land. The results were in the same direction, though not quite so marked. There was always the softer, more starchy, wheat on the soil containing the more humus, the moister land. We have no later data than 1906 from this district, as for want of co-operation we unfortunately were obliged to abandon further experiments in that district.

It occurred to me that if the protein content of the wheat was affected by the moisture content of the soil, we should find that the irrigation of land in arid districts would lead to results similar to those I have already reported from the moister



soils of northern Manitoba—a relatively soft wheat. On non-irrigated land we should obtain a more glutenous wheat, though the yield might be less than from wheat grown on irrigated areas. To get data as to this we inaugurated a course of experiments at the branch Experimental Farm at Lethbridge two years ago. We have there provision for carrying out experiments under irrigation and under dry farming methods. These experiments have been extremely interesting and an account of them will be found in my last annual report. The first year of experiment was one which was not at all favourable to our investigation, simply from the fact that there was a fairly liberal rainfall that season and there was no necessity of irrigation until the 15th of July, and then we made only one irrigation. However, we determined the moisture content of areas sown with wheat, irrigated and non-irrigated. When we began, the moisture content on the non-irrigated land was 15.61 per cent, and on the irrigated it was 16.56 per cent. These determinations were made May 14th. The moisture content on the 'irrigated' land before irrigation on July 15th was 8.78 per cent and on the non-irrigated land 8.11 per cent, so that both plots up to this date had approximately the same moisture content. The soil on the non-irrigated area continued to dry out, but owing to irrigation the percentage of water on the other plot was much higher. Let me give you the percentages of protein in the wheats grown on these irrigated and non-irrigated areas. The original Red Fife seed contained 15.95 per cent of protein, indicating a very fine, hard wheat. Grown on irrigated land it possessed 13.7 per cent of protein, while that grown on non-irrigated land had 16.37 per cent. This remarkable difference is directly traceable to the differences in the moisture content of the two areas. Kharkof, a winter wheat grown on irrigated land, gave 12.11 per cent of protein and on non-irrigated 13.12 per cent. The difference is not very great, as with the Red Fife, but it is in the same direction and quite marked.

This work was continued at Lethbridge during the past season (1909), and again the results confirm our opinion respecting the relation of moisture content to the composition of the wheat. I may briefly tabulate the more important data.

Moisture content of irrigated and non-irrigated areas at Lethbridge, 1909.

Date.	Irrigated.*	Non-irrigated.
July 10. . . . .	9.62	8.50
August 12. . . . .	8.19	6.20
August 25. . . . .	8.16	5.99

The irrigated plot started out with slightly more moisture. After the irrigation it must have contained several times the amount of water found in the soil of the non-irrigated plot. By the middle of August, the difference between the plots was 2 per cent. The results of August 21 show that the irrigated land was holding its own but that the non-irrigated soil was becoming more and more dry. During a very important period in the development of the wheat plant, from the middle of July to the middle of August, the crop on the irrigated area had an abundance of water, whereas that on the non-irrigated land was subjected in a degree to drought conditions, as the season was a very dry one.

The wheat sown on these two areas was from grain grown on a non-irrigated area of the previous season. Its protein content and that of its products on irrigated and non-irrigated soils are as follows:—

	Protein.
Red Fife, seed sown. . . . .	15.25
“ irrigated area. . . . .	12.84
“ non-irrigated area. . . . .	17.66

These data indicate the very large difference in protein content between these wheats—that grown on the non-irrigated area being 5 per cent higher. These are the most pronounced results we have so far obtained in this investigation.

\* The irrigation was made directly after the collection of the samples on July 10.

For a number of years we have had barley under examination, and we find that this cereal, like wheat, increases in its protein content when grown under conditions which may be described as semi-arid—when the climatic conditions are such that the period between the formation of the kernel and its maturation is shortened. Barley with low protein content if grown in the northwest at once becomes more nitrogenous, less starchy. This tendency will in all probability be found in all cereals, corn included. And as a general deduction we may say that the grains grown in the north-western provinces will, for this reason, have a very high nutritive value.

Mr. RAYNOR.—How does irrigation affect the quality of the barley?

Mr. SHUTT.—We have no results to show. I have no doubt, however, that it will be in the same direction as with wheat.

Mr. RAYNOR.—Lower protein?

Mr. SHUTT.—Yes. Our British Columbia barleys are low in protein—especially those grown under irrigation.

Mr. ARCHIBALD.—Would oats also decrease in protein as the moisture content of the soil increases?

Mr. SHUTT.—A chemist does not like to speak without data, but I expect to find it so. I see no reason why it should not act in the same way, though perhaps not in the same degree, with oats as with wheat.

Mr. RAYNOR.—I should like to ask one question about the amount of bran in wheat. Is there any difference between the endosperm of wheat and that of barley?

Mr. SHUTT.—I think Dr. Saunders would be able to answer that better than I can. We made an examination and found a difference in the nitrogenous content of various brans, but I cannot give you any figures as to the relative proportions of bran and endosperm. It occurs to me to give you these figures. They do not represent the bran on irrigated and non-irrigated areas, but they do give us the percentages of fibre in the flour made from wheat from irrigated and non-irrigated land. There is a slight difference; we found 0.15 per cent from the irrigated and 0.12 per cent from the non-irrigated. The difference may have arisen from slight and unavoidable differences in the milling, which was done in an experimental roller mill.

Dr. C. E. SAUNDERS.—The only difference shown in my work is that the more starchy samples of any particular variety of wheat give a larger percentage of what millers call break flour, which is to them a less desirable product, as it cannot be sold at the same price as patent flour. In regard to the percentage of bran, I have not made careful determinations, because I do not think it possible to do so in a satisfactory way with the apparatus at my disposal, the problem being one of extreme difficulty. It depends so much on the exact details of the treatment of the grain in the mill that to obtain satisfactory results from which to draw positive conclusions would require elaborate apparatus.

## SELECTION OF SEED OF FIELD ROOTS AND VEGETABLE CROPS IN CANADA.

(By Otto Herold, Waterloo, Ont.)

Mr. CHAIRMAN AND GENTLEMEN,—I feel highly honoured in having this opportunity of addressing this splendid gathering of gentlemen, who through their united and individual efforts have accomplished such great results in the improvement of our grain, corn and potato crops. I hope, by laying out our past experiments and future plans before you, to interest you in the growing of vegetable, field root and flower seeds in Canada, an industry which promises to be of the greatest importance to our



market gardeners and farmers. I trust that you will give this matter due consideration and that the Canadian Seed Growers' Association will take it up and carry it through to a successful issue.

I arrived in Canada early in 1906 from Germany, my native country, where I had spent practically all my time in seed growing, having been born and raised in the province of Saxony, which is the centre of the seed growing industry. I soon learned to my surprise that all vegetable, field root and flower seeds used in Canada were imported and from my long experience in the European seed industry I knew that large quantities of second class seeds are exported to the United States and Canada. It struck me at once that here would be a great opportunity of putting to good service my past experience. I am sorry to say that my plans were not generally approved of by the Canadian seed trade and I found little encouragement. The reasons given were that the wages are too high in Canada and that it would be impossible to bring the roots (stecklinge) through the winter. However, being an optimist, I was not so easily discouraged and a friend of mine sent me some sugar beet stecklinge from Germany which arrived here very late in the spring and were badly dried out, but I planted them nevertheless, though I had only a poor piece of ground in the back yard of a city lot. To my great delight the mangels grew and produced a fair amount of seed. In the beginning of the summer I rented a farm and made some experiments with other vegetable seeds which proved a success and encouraged me to extend this work. Further observation convinced me more and more that I was following the proper course. Suitable land in Ontario is so very cheap in comparison with the enormous rents and prices in my 'Vaterland' that they offset to a certain extent the price of labour. The climate in the different provinces is suitable for the raising of different kinds of seed. Though I think we can raise most of them in Ontario, cabbage and turnip seed ought to do best in the maritime provinces. Another most important observation is that we almost invariably have excellent weather during the fall—sunny days and dry cool nights which help to mature the seed and enable us to harvest it under the best possible conditions, thus insuring a high percentage germination and high vitality.

Seed growing in Canada being a new industry has the advantage over that in older seed growing countries in being free from blight which injures mangel and carrot crops in these countries, to a larger or lesser extent according to the weather.

The year 1909 was extremely unfavourable owing to the very late spring and the wet weather during the following months but nevertheless we had nearly an average crop. We lost our stecklinge the first time out of four, but we think that we have learned to obviate this in the coming season. It is easily understood that owing to the difference in climate different methods of wintering the roots have to be adopted according to the local conditions. This knowledge can only be gained by experiments though such are costly for the individual undertaking them.

I contend that we will be able to grow seed here not only of as good a quality as that produced by the best European seed growers, but we will have one further immense advantage of producing acclimatized seeds. It is a law of nature that plants as well as animals adapt themselves to the climate where they live. This of course takes some time. Man and animals will become accustomed to a colder climate if they are gradually hardened. As one of the most striking examples of this I may mention the ostrich farm at Hagenbeck, near Hamburg, Germany. There you can see the ostrich, an inhabitant of tropical climates, running about in the snow enjoying the outing and in the best of health. However, with annual and biennial plants, the period of vegetation is so very short, they have no time to get acclimatized in one year. Plants are also adapted to a certain soil and climate. Professor Dr. Blomeyer, of the Agricultural University of Leipsic, writes in his celebrated book, entitled 'The Culture of Agricultural Plants,' that all plants lose their precocity if planted in regions in which they have a longer period of growth, and vice versa. Almost all garden seeds sold in Canada, so far, are raised in sections which have a climate differ-

ent from that of ours. I am absolutely convinced that after we have selected strains of vegetable and root seeds for three or four years we will be able to get earlier, larger and surer returns from our vegetable and field root crops than now. Again, it is wonderful what even one year's selection and acclimation will do as shown by experiments of the Ontario Agricultural College in Guelph. In the fall of 1906 they selected a few roots of the Yellow Leviathan and brought the same through the winter and had a good crop of seeds. When these were planted out in 1908 they gave an enormous yield of 53.55 tons per acre, whereas the best imported seeds yielded only 39.71 tons to the acre. I note similar results with our lettuce and tomatoes. After the first year's selection a very marked improvement in quality, quantity and earliness of the crop was to be seen. This statement is also borne out by a few little experiments which market gardeners have been conducting. Some of them have grown their own seeds, though in a rather crude way, and they have proven superior to anything they could obtain through the seed trade. Of course this does not pay them as they require only very small quantities, and it takes too much time to give them the proper attention without which they are easily spoilt or lost. These observations I consider as undoubted proof that by continually selecting our Canadian grown stock seeds we will achieve wonderful results and I am convinced that the best seeds produced anywhere will not compare in earliness, weather resistance and yield with our Canadian grown seeds.

The Dominion Department of Agriculture, recognizing the great importance of this new industry, authorized experiments to be made by us in the growing of vegetable and field root seeds. The object of the experiments was to ascertain whether and what kinds of our field root and vegetable seeds can be successfully grown in quantity for commerce in Canada as a business proposition. For that purpose, the department agreed to meet a part of the estimated expenses for the production of stock seeds which requires a great deal of skilled labour, and which in Denmark is now done by the department itself. We find that the allowance which the department was good enough to make for this additional expense, which must necessarily be incurred in the operations of seed growing, is inadequate, considering the cost of labour in Canada. As seed growers, we would much prefer that the Department of Agriculture itself should grow and select those stock seeds of the kinds which they know are best for use in Canada and leave it to us as seed growers to take the stock seeds so produced and increase the quantity in its state of purity. We would be willing to pay a high price for those stock seeds rather than have to produce them ourselves, but this does not exclude any one from improving certain kinds of field roots and vegetables.

In the following outline I shall give a short description of these experiments. Owing to the short time that has been allotted to me it is impossible to fully describe the methods of growing the different kinds of seeds which we produce, and I shall therefore give only the principles of seed selection and seed growing which we apply, and by way of explanation shall give details of a few of the main crops. We are employing 'Family Selection' on our fields with which the members of the C.S.G.A. will be conversant. We select in the field the best plants which come nearest to our ideal, taking into consideration earliness and productiveness, as well as quality of the fruit and trueness to type. The seed from these different plants is saved by itself and planted out the following year by itself, and where there is a possibility of cross fertilization this must be carefully avoided. All the offspring of these plants are carefully inspected to ascertain whether the good qualities of the parent plant have been inherited and fixed. If a certain number do not come up to the standard the whole family is discarded as it shows that the variation must have been due to some local influences. Rows which have passed this examination are again harvested separately and the seed planted out in multiplying plots to produce the stock seeds from which in turn is grown the general crop. This is easily enough described on paper but involves a large amount of work by seed experts.

As an example of the cultivation of the biennials I will take mangels. The mangel seed is drilled out in the early summer in rows 2 feet apart and about 20 lbs. to



the acre sown, so that the roots, called stecklinge, will not grow too big; but they must be large enough so that the type and colour can be distinguished and in order that it will be easy to bring them through the winter in good condition. The stock seeds should not be grown from these small stecklinge as it is impossible to properly ascertain their productiveness or make chemical analysis of the dry substance and sugar content which constitute the feeding quality. The colour and type can also be better judged from a larger root. As examples of our work with annuals I shall take lettuce and radish seed. In many catalogues you will see the remark 'Radish seed grown from transplanted plants.' As I am acquainted with seed growing in Europe I may mention that in most cases this only means that the stock seed has been grown from transplanted plants, but the general crop is sown in place and the seed grown without transplanting. This may be verified by pulling up a crop of radishes and noting the variation in type. Even radishes from the best sources will rarely go beyond 50 per cent in trueness to type. With the help of our transplanting machine we have adopted a new system of growing all our radish seed from transplanted plants. The advantage will be apparent and the actual experiments have borne out our statement. The radishes are sown in seed beds early in the spring, and when big enough they are pulled and all not true to type and colour are thrown out and only the selected roots are transplanted. Of course seed produced in this way is better than any obtained in the trade and the higher price for such seed will be readily paid by market gardeners if they realize its superior quality.

Another important crop for the market gardener is lettuce. Every market gardener knows that transplanted lettuce will form better heads, and to properly test lettuce it should be transplanted. Starting out with this idea we transplant all our lettuce which is designed to produce seed. It is first sown in seed beds and when the plants are large enough they are planted out with the transplanting machine so that every plant can develop properly and form good heads. It is apparent that these lettuce plants may be rogued much easier and with more accuracy. As lettuce forms one of the important greenhouse crops we grow special seed for this purpose. As it is most important for the plants to develop quickly, we start them in hot beds and plant them out as described above.

We have experimented with the following crops: Beets, carrots, radishes, lettuce, onions, cucumbers, muskmelon, tomatoes and mangels.

The stecklinge of the mangels, field carrots, cabbage and celery plants did not come through the winter. However, we think we have solved the problem to a certain extent and hope to avoid future failures.

Spinach was a failure on account of the ground being in too poor a condition. Other biennials, such as parsnips, swedes and garden turnips, we were not prepared to plant out, but they will be grown this year as we grew the plants last summer. In addition to the work above outlined, we have carefully saved selected stock seed of all the different crops.

From the foregoing it is apparent many difficulties have to be overcome before this new industry will be established on a paying basis. I will again briefly summarize them.

I. We need help of skilled experts.

II. We need experienced labour.

III. The wages paid in Canada are very much higher than those paid in European seed raising countries.

IV. To isolate crops of wind-fertilized plants it is necessary to have farms located at a distance from each other.

V. It is impossible to grow every variety in Ontario. We can grow most of them, but will depend on the assistance of other provinces.

This brings me to the last part of my paper, 'What the Canadian Seed Growers' Association Should do to Help this New Industry.' The last two difficulties enumerated, namely, isolation of crops and the growing of certain crops not suitable for Ontario, could be overcome if the members of the association in other provinces would

take hold of this work. However, this in its turn would create certain difficulties: the instruction of the growers in this new line of work; supervision and strict inspection, so that the new industry will not receive a 'black-eye' at the hands of some inexperienced growers; and the supply of suitable stock seeds. I understand that the Dominion Department of Agriculture is in a position to supply an expert to instruct the individual growers, and I would suggest that the seed inspectors also be instructed to inspect these crops of vegetable and field root seeds. Just as important as a proper foundation is for a building are proper stock seeds to the seed grower, and, as I explained in the first part of this paper, in growing these stock seeds the method of family selection should be employed. It is apparent that not every farmer is in a position to do this to advantage, and it would be advisable to have it centralized. For the start I think that we could do this work at our farm, and in order to have it properly inspected and to make sure that the types we are growing are what are wanted by the consumer, I would suggest that a commission be appointed composed of officers of the Dominion Department of Agriculture, the Canadian Seed Growers' Association and the Ontario Vegetable Growers' Association to inspect our field and stock seeds two or three times a year; thus this new industry would profit by the large experience of those men who are recognized leaders in agricultural matters. The price of these stock seeds would, of course, be quite out of proportion to the price for regular seed and as they are of such great importance nothing should be spared to bring them up to the highest possible standard. I should think that the Svalöf plan, which has given such wonderful results in seed grain production in Sweden and has given this institution a name which is known all over the world, might serve as a model for a similar Canadian institution. Svalöf is divided into the scientific and the commercial organizations which are quite distinct from each other. The scientific society was founded in 1886 and obtained in its early days a temporary grant from the Swedish government, but at the present time it receives an annual subvention of about \$10,000 from the government, besides subscriptions from its members, from the agricultural societies and from the Swedish Seed Company, making a total annual revenue of about \$20,000. This money is exclusively devoted to the study of the question of seed selection in both its scientific and practical aspects.

In closing I wish to thank you for your kind attention and would urge you to endeavour to solve the problem of having all our seeds grown in Canada, thus not only keeping an enormous amount of money in the country, but also assuring the farmer of largest possible crops.

MR. INNES.—This is a line of work with which I have had little experience in this country. In Scotland I had some experience with turnips and with root and vegetable seeds. Canadian grown seed seems to be doing better here than is imported seed. Two years ago, Mr. Briggs led us to understand that a great number of garden seeds cannot be raised here, and last year again Mr. Steele made the same assertion. This conflicts with Mr. Herold's views.

If you were choosing a piece of ground to raise seeds on, would you prefer to have it heavy, rich and well manured, or lighter and not so fertile?

MR. HEROLD.—It would depend upon the kind of seed I was trying to raise. Lettuce seed needs a light soil, mangel seed a heavier soil. If you put on too much fertilizer for lettuce, it will not ripen. But you can manure your land heavily for mangels.

MR. INNES.—What about turnips?

MR. HEROLD.—They are like mangels in this respect.

MR. INNES.—In Scotland we raised from one and a half to three acres of turnip seed each year for one of the largest seed firms of that country. The seedsmen of Scotland did not want ground of high fertility for growing seeds. They did not want anything better than a piece of old sward or pasture for turnips, and



no manure. They did not want a great hearty growth. We always tried to choose some part of the farm that was isolated from every other part, to prevent cross-fertilization in our turnips. Different kinds of cabbage seed may be grown together, but only one kind of turnip or mangel seed.

Mr. HEROLD.—I think the seed bed should be of good soil. I do not think poor soil will give a good crop of seeds.

Mr. INNES.—Three years ago I planted in my orchard turnip seed brought from Aberdeen. It did very well and I thought I would try to raise my own seed. I planted the Swedish turnip and the Aberdeen turnip in the same field, but they were badly mixed. Have the bees anything to do with this?

Mr. HEROLD.—Yes, I think so.

Mr. INNES.—If we could grow our own seed in Canada it would be a great thing for the country.

I should like to hear from Mr. Macoun about cross-fertilizing by bees.

Mr. MACOUN.—I have had no experience with this question.

In regard to soil for root crops, I think the whole question lies in the nourishment the mother plant receives the first year. I think the mother plant should be grown in rich soil, to get as much vitality as possible; but the next year, the nourishment for the seed being already stored up in the root, it is rather a question of moisture in the soil to prevent the crop from drying up than richness of soil.

Mr. INNES.—With turnips the main question is to keep the moisture in the roots during the winter. I do not think it a good policy to store roots in a cellar. They have to be put in a pit to retain the moisture.

Mr. CLARK.—We have some members of the seed trade here to-day. I think we should hear from them. During the last two sessions we have been hearing quite a few of our members speak of home-grown seeds. I visited last year in Holland, Denmark, Sweden, Germany and France, and inspected a dozen or more of the best seed farms to be found in Europe. I also visited dozens of small irresponsible seed growers. I was a little bit disappointed in visiting two or three of the largest and most perfect seed farms I saw, when I asked the proprietors of the farms how much seed they were sending to Canada, to hear them say 'None at all,' or 'A very small quantity.' They told me that Americans (they do not distinguish between Canadians and Americans) do not want the seed they raise as it is too high priced for our use. I traced some strains of the best sorts of field roots produced in Europe back to Canada—selected strains which in Europe they prize highly—and found that some of them are not suitable kinds for growing here. That is to say, the kinds they select to fit into the soil and climatic conditions in Germany cannot be depended upon to be the best kinds for this country.

I talked with the manager of the seed company where I saw the best work with field roots about getting some of the seeds for Canada. He told me it would be unwise to take to Canada large quantities of seed. 'Take small quantities and have them tested in different parts of the country, then you will learn which varieties are better than what you now have. Your order should also be placed in advance, for we do not grow seed for any person unless it is ordered a year ahead,' was his advice.

That is the custom of the trade. At the General Swedish Seed Company and at Dippe's and Mette's in Germany, they are prepared to give a guarantee of the purity of the stock and the germination of the seed they sell. They charge a relatively high price for it. No other company I met would think of giving any guarantee for the seeds they sell to our Canadian seed merchants. The companies I speak of have from 2,000 to 6,000 acres of ground. They grow their own seeds under the supervision of their own staff, and they make each member responsible for the seed he is growing from the time he commences with it until it is shipped. They hold that man responsible and are able, with pretty nearly all their stock, to give a guarantee. Many of the seedsmen I met have their seeds grown for them on contract. A great deal of

seed grown on contract is of really good quality. From the information I got—though I am not able to judge as well as long experienced seed merchants could judge—they would probably be classed as second to the very best quality grown.

Our market gardeners in Canada have been urging for legislation that would require the seed merchants to be responsible for the genuineness of the seed they are handling. It seems to me that it would be unfair to them to hold our seed merchants responsible for conditions as long as our seed is produced where we cannot get directly at the grower. I do not know whether seed can be successfully grown in Canada in quantity for our commerce. If there is anything that will prevent it, I am thoroughly satisfied now that it will be the cost of labour. From Nova Scotia to Vancouver Island, we have a variety of climates well suited to growing all kinds of garden seeds that are now grown in Europe. Denmark seems to be the place above all others for growing cabbage and cauliflower seed. We have an equally good climate for growing these seeds on our coasts. We have not, however, the men with the knowledge and inclination to do the work the seed growers of Europe are doing. It may be some years before our farmers will take up the work of growing vegetable and other garden seeds. It has been a source of encouragement to me to see Mr. Herold come from Germany and take up that work in the German settlement at Waterloo. I hope he may be successful.

The Honourable the Minister of Agriculture is prepared to bring to Canada from Europe a man thoroughly trained in the practice and science of growing and selecting seed of field roots and garden vegetables, and place him at the disposal of the people of Canada who have the ability, land and inclination to go into that work.

Mr. SIMMERS.—Amongst the largest lines dealt with by the European seed trade is the sugar beet. The United States takes an immense quantity of sugar beet seed. I think I heard a man say they shipped 100,000 bags of 112 pounds each to the United States. Mr. Clark mentioned some of the sections where sugar beet seed is grown. They deal in this seed to such a tremendous extent that it would be difficult to make a comparison of the seeds sent to Canada and to the United States.

The mangel that Mr. Archibald refers to as being of the Tankard shape is carefully grown in Germany where it is called, I think, the Eckendorf type. It is, of course, grown largely only in Germany. Were you to apply for seed this year, I do not think you would be able to buy it, except in a small way. I have not noticed in any Canadian list any variety similar to that particular type. If you take the other varieties, I think the European stocks will compare well with anything grown in Canada. I do not want to disparage anything grown in Canada, it is only to bring out the points.

Some eight or ten years ago I was given to understand there were 30,000 acres of peas grown for seed purposes between Port Hope and Picton. I have no knowledge of what it is to-day, but I believe it is much less than it was then. One of the firms has moved to the States, perhaps on account of the pea weevil. I spoke to one of these pea growers the other day and he was disgusted with the present condition of things. Talking of labour, I spoke to Mr. Herold about it the other day. He admitted that the condition in this country is that the employer does the work and the other man gets the money. I think that explains the difficulty of growing seed in Canada. In Holland you can get fairly good men for \$3 a week, and an unusually good man for \$5 a week. You cannot get a good man in this country for less than from \$10 to \$15 a week.

While I do not wish to disparage the idea of growing seeds in this country, yet this labour question is undoubtedly a serious difficulty. The amount of vegetable seeds required, furthermore, is comparatively small and in case you had a surplus it would be difficult to sell them in another country, for they are very particular and want to know the pedigree of what they buy.

Mr. RAYNOR.—We have had some experience in visiting men and hearing them talk about what they have done in producing seeds, and I believe that seeds can be produced



in Canada. There is no question about that or about their quality. We have had an opportunity of visiting the farm of the Ontario Seed Company during three years. Their work is of varied character.

What Mr. Herold has said about producing seeds we can verify after having inspected the grounds and having looked over the crops. If there is any place in Ontario where garden seeds can be produced to perfection, it is at Waterloo. Mr. Herold says in his paper that he will solicit a number of farmers to grow seeds on a large scale. I believe he will solve the labour problem in that way. I met Mr. Hare of Whitby, Ont., and he informed me that he had been selecting a variety of beets for some years. At first he could not get sale for his seed, but finally, in an indirect way, it got into the hands of William Ewing of Montreal. Some of the market gardeners got some of the seed and came back for more. If Mr. Hare had known of it in time he would have made money, for the influence of his beet seed in that district was manifest. I have met farmers growing their own turnip seed, and they say it is better than the seed they buy from seed merchants imported from the old country. On the farm at Guelph last year, they left some roots in the ground, and by giving them a little protection along with the snow, they lived through the winter and produced seeds last summer. I learned recently that the Ontario Vegetable Growers' Association had discovered that they could get better potatoes from Muskoka and Parry Sound than from Michigan, Wisconsin and other western states they had been importing from. That would bear out what Mr. Macoun said yesterday, that it would be a good thing to exchange seed, under certain conditions. In opposition to that, six men whom I have met in this province have been growing one variety of potato for 25 years or more, without any other selection than taking the best tubers for seed and to-day they are doing better than when they commenced. I do not believe that these varieties wane after 12 or 15 years. Under certain conditions and in some places throughout the country, certain varieties, including the Early Rose, White Elephant and Empire State have actually improved. These men are carrying on work with these potatoes to-day. I understand from Mr. Herold's paper that he is making application for membership in the association, with a view to growing these garden and vegetable seeds under inspection. He mentioned a method of inspection by experts from three different sources to look over the fields. I would strongly recommend that if the constitution will not take him in under present conditions, some arrangements should be made so that Mr. Herold should be received and be able to carry on his work as a member.

Mr. HEROLD.—Did Mr. Simmers see any seed fields in Canada? Do you know what the average crop in these would be? I think outside the Seed Branch officers, nobody has seen any seed fields in Canada. I assure you that we got more than 1,000 pounds of radish seed per acre. The Canadian seed merchants are importing from foreign countries at from 12 cents to 15 cents with 10 per cent duty, which makes the price about 16 cents laid down in Toronto. If the seedsmen could get stock of first quality and supply farmers with it, the farmers could sow this with their seeders, and if they got only a thousand pounds of seed per acre, seedsmen could pay them 15 cents or 16 cents per pound for it, and I think that would be a good crop—\$150.00 per acre.

I thank you, gentlemen, for the encouragement you give us in the raising of our field root seeds. I am convinced that after two, three or four years more, we can get better strains and better acclimatized seed than we are getting now. But I do not want to condemn the seedsmen. They have done much for Canada. I am sure they try to get the best seeds they can. I am convinced that if the seedsmen could get a better quality of seed in Canada than elsewhere, they would prefer to buy in Canada. If the farmers could get a good profitable crop of lettuce seed, I think the seedsmen could easily contract with them to raise it. A crop of 300 pounds per acre, worth 30 cents or 35 cents per pound, would pay well. In this work good stock seed is very important. If the farmer sows his seed with a seeder, takes a harvester to harvest it,

and threshes it with a separator, there is not much labour. Our seedsmen can afford to pay ten per cent more for home-grown seed as they have to pay ten per cent duty on imported seed.

Mr. WOOLFORD.—The best encouragement we can give these seed raisers is to give them our patronage and support. If they have the extra quality in their seed, there will be little trouble in disposing of it in the west. We are after good seed and we are willing to pay for it.

### CANADIAN GROWN MANGEL SEED.

(*Prof. C. A. Zavitz, O.A.C., Guelph, Ont.*)

Nearly all of the seed of field roots, which is used in Ontario, is grown in Europe. From certain preliminary experiments and observations which we made previous to the year 1905, we obtained the impression that root seed produced in this country was likely to give very satisfactory crops. During the last three years, we have carried on systematic work in the production of seed of mangels, swede turnips and carrots, and have been testing the seed so produced with seed of similar varieties which has been imported. In the autumn of each of the past four years, roots were selected and stored during the winter and were re-planted in the spring. Some of each class of roots were pitted in the fall, some were stored in piles in the root cellar, and some were placed in sand. We have, however, found it difficult to pit a small quantity of roots and have the roots under the same conditions as those which have been pitted in large quantities. In the other methods of storing, we found we could obtain practically as good results when the roots were stored in loose piles in a cool cellar as when they were packed in sand, but there was less mould and sprout in the early spring from the latter than from the former method.

During the past few years, we have obtained some very good results indeed from home grown root seed. The home grown seed proved to be higher in germination and was more productive of roots than the seed which was imported. The Ontario grown mangel seed surpassed the imported seed in yield of roots per acre in 1907, and also in 1908. In the autumn of 1907, the mangel seed did not ripen as evenly as in the year previous, some of the plants producing but little ripened seed. In the fall of 1908, however, all kinds of root seed matured very well.

In 1909, thirty-five lots of mangel seed were sown in the experimental department. Of these thirty-five lots, thirty were seed grown in Europe and five were seed grown in Ontario, four at the college and one at Waterloo. The first seeding took place on May 21. Of each variety three rows one chain in length were used. As the rows were  $3\frac{1}{2}$  links apart there was exactly  $\frac{1}{400}$  of an acre in each of the thirty-five plots. The seed was planted with great care by placing exactly four clusters of seed every ten inches in the row. There would therefore be 948 mangel clusters, usually called seeds, of each lot planted. After the mangel seeds had made a growth, careful observations were made and it was seen that the European seed was much poorer in germination than that produced in Ontario. In order to study the germination of these different lots of mangels more carefully, the thirty-five varieties and strains were again planted on June 12 in exactly the same way, except that the plots were made smaller in size. Again on June 25, all the different varieties and strains were sown in two sets. In one set the mangel clusters were sown separately and in the other, two clusters were planted in each place. These four different sets sown on the three separate dates gave an excellent opportunity for studying the germination of the mangel seeds under field conditions. As the germination of nearly all the European seed was so poor no results can be furnished regarding the comparative yields of the different varieties. The



experiment is confined almost entirely to the germination of the seed which was carefully determined in each set which was sown. The results were very similar throughout the four separate tests and showed marked differences in the germination of the seed of the different varieties and also of the European seed as a whole, as compared with that which was grown in Ontario. Of the thirty-five different varieties and strains under experiment, the first, second, third, sixth and ninth lots highest in germinating power were from Ontario grown seed, and all the rest were from seed obtained from seedsmen in Ontario, United States, Great Britain and the continent of Europe. The highest germination was from Ontario seed and amounted to 174 per cent, while the lowest was from imported seed and amounted to only 15 per cent. Each of the twenty-three lots which gave less than 100 plants from 100 seed clusters was imported seed. The seed of the six varieties which gave the lowest germination of all was imported by Ontario seedsmen and purchased from them by the college in the spring of the present year. It seems to me that this is a very serious problem as the mangel crop is becoming of greater importance in Ontario from year to year. The poor germination of the mangel seed in 1909 may account for the fact that the yield was 46 bushels per acre less in that year than in the average of the past 28 years. As a large amount of seed is usually sown per acre by the farmers in Ontario, there was probably a weak germination and many blanks in the crops which would bring the average down to 410 bushels per acre.

## SEED SELECTION AS PRACTISED IN EUROPE WITH WHEAT, OATS AND BARLEY.

*(By Geo. H. Clark, Seed Commissioner, Ottawa, Ont.)*

Prior to 1906 I frequently took occasion at farmers' meetings and elsewhere to state my belief that by continued selection from year to year of the best heads of wheat, oats or barley, from the best and most vigorous plants, the productive capacity and quality of these grains, and also the strength of straw and its rust resistance, could be gradually but materially improved, much to the benefit of the farmer. I have not changed my opinion as to the principle; but, from a study year by year of the results of selection by members of this association, followed last summer by an opportunity to see the work of experts who have devoted the greater part of a lifetime to a study of plant improvement, I have modified my views as to the extent to which improvement may be made by mass or multiple selection, which is the principle of selection that is embodied in the constitution and instructions issued by the Canadian Seed Growers' Association.

We cannot expect the farmers in the different parts of Canada, who are making a specialty of growing and selecting seed grain, to compile accurate records that could be used to advantage in support of an argument in favour of mass selection. But I have had occasion to visit and inspect the work of many of the prominent seed growers, and, more frequently, to discuss with them the progress they have made. Fully 85 per cent, I should say, of the farmers who have been doing this work know full well that the crops they now have, as the result of several years selection, are more uniform in character and capable of giving larger yields of grain per acre than the crops from unselected seed of the original stock that is commonly available for comparison on adjoining farms. Many of those farmers who commenced with the common kinds and varieties of grain, which had been grown by them or in their district for many years, obtained what might be justly called excellent results as the reward of the first three years of careful selection.

Since 1906 the observations which I have been able to make, and a study of the work that has been done in other countries, have gradually led me to the opinion that

the success of our seed growers who are doing the work of mass selection with varieties of wheat, oats or barley which they formerly grew, has depended, to a greater extent than some of us believed, on the care exercised by them when making their first selection. If, in making their first selections, they picked one or more heads from plants of outstanding merit, then by degrees their process of further selection would be likely to increase those specially desirable plants which they had by their first selection introduced into their breeding plot. If, however, on the first selection they were not so fortunate in collecting heads from outstanding individuals of merit, then their results since that time have afforded them less encouragement.

The system of mass selection now followed with cereal grains by members of the Canadian Seed Growers' Association has, until quite recently, been adhered to by German seed growers. During my visit to them last summer, I took occasion to outline the methods employed by the members of this association to different men whom I met and who were engaged in the work of plant improvement. They all seemed to be thoroughly familiar with the plan and the principle it embodies, and several whom I met are continuing with that plan in a modified form. Nearly all of them have been influenced by, and are now adopting or incorporating into their methods, the principle that has been so effectively applied in the improvement of crops by Prof. Hjalmar Nilsson at Svalöf in Sweden, whose methods of work I desire to present in this paper.

Svalöf is situated an hour and a quarter by train north of Malmö. The principal experiment station in Sweden, which is under the direction of Prof. H. Nilsson, is located at Svalöf. The institution is a private one, but is supported by the government of Sweden, the agricultural societies, subscriptions of members and some slight revenue as follows:—

*Swedish government . . . . .	Kr. 40,000	\$10,000
Agricultural societies. . . . .	20,000	5,000
Swedish Seed Company . . . . .	10,000	2,500
Members' subscriptions. . . . .	5,000	1,250
Revenues. . . . .	5,000	1,250
Total. . . . .	Kr. 80,000	\$20,000

Cost of scientific building, Kr. 300,000.

1 kronor = 27 cents.

The scientific staff is composed of Prof. Nilsson, five specialists and their assistants and labourers. The scientific grounds include about 30 acres (15 hectares), but the staff makes use of any areas required by them to grow isolated plots on the grounds of the General Swedish Seed Company, which comprise about 5,000 acres, 1,200 acres of which immediately surround the scientific grounds.

The organization of the scientific staff at present is as follows as to their work:—

1. Specialist for barley, peas and vetches.
2. " wheat and oats
3. " grasses and clovers.
4. " potatoes.
5. " rye.

Provision is made for enlarging the staff to include ten specialists, each of whom will give all his attention to the improvement of one particular crop.

In addition to the station at Svalöf, where the principal work is done, a station for test plots and further scientific work is maintained at 5 degrees north (near Stockholm) and another ten degrees north, which is in the northern part of Sweden. These sub-stations are in charge of assistants to the members of the principal staff at Svalöf, who visit them frequently for the purpose of working out the best selections of the various crops for the districts represented by the stations.

Prof. Nilsson, as a trained botanist, worked as a specialist for several years under the direction of his predecessor. His work from 1888 for six years was based on the advantages of selection alone, so called 'mass selection.' Large heads were picked by



hand, and by the use of an automatic appliance the heaviest were set aside and used as seed. From these, only perfect kernels, showing good quality, were taken, the object of the selection being to secure stronger straw, earlier maturity, greater immunity from rust, as well as increased yield.

Observation taught him that plants having not more than three stools ripened more uniformly. These therefore were selected, care being taken to keep the plants uniform in characteristics. Only the primary heads were selected, and of these, only those of heaviest weight per machine test were set aside for improved increase.

After six years he found that, as compared with the original non-selected and impure stock, he had increased the yield, due, he states, to the elimination of undesirable forms of weakling plants; but very little, if any, increase in yield was secured after the first two or three years.

As to the main characteristics of the plant, including strength of straw, immunity from rust, improvement in quality of grain (except because of the undesirable mixtures) and earlier maturity, no improvement whatever had been made as compared with crops from the original stocks.

Collateral tests were made with Chevalier barley, by using only the heavier seed from the centre of the ear or spike.

His unalterable conclusion, drawn from an immense amount of careful work in this plan of selection, was and is that the plant cannot be forced, in a way, to alter its main characteristics by the adoption of any practices at present known. This was disappointing to the Svalöf staff, especially because the farmers of Sweden had been promised by Prof. Nilsson's predecessor that, as a result of their financial support, he would in a few years be able to provide them with varieties of grain far superior to the common sorts then generally grown and especially with what was most needed, varieties of grain with stronger straw, and this was to be secured by selection alone.

In 1890 and 1891 he had selected in the open fields in different parts of Sweden 1,000 or more individual barley plants of seeming merit. He sorted them into three groups according to apparent type and dibbled the seed into plots. The resultant crop from each type proved to be a motley collection of individual plants, markedly not uniform in many important characteristics, as maturity, stooling, strength of straw and rust.

In 1892, Prof. Nilsson commenced to base his improvement on the individual plant of outstanding merit, considering a combination of desirable characteristics.

The principal work, the most difficult task, is to locate and separate out the best individual. Prof. Nilsson and his staff spent much time in patiently searching in the common grain crops throughout Sweden for individual plants of superior qualities. These he calls 'mutants,' or sports that will increase true to type. mostly, he thinks, due to natural cross-fertilization, which occurs in nature but rarely. He has found such sports, the type of which was not fixed but would continue sporting in a manner quite similar to the product of artificial crosses, and under conditions of growth whereby the plant so located as a sport must surely have been produced by natural cross-fertilization. To a trained specialist, who devotes his entire attention to the study of one, or at the most, three kinds of crops and their improvement, the occurrence of mutants in ordinary field crops is quickly observed. They occur in relatively large numbers, but exceedingly few of them are worth transferring to trial plots for comparison and further study. These trial plots lead up to discarding thousands of the individual 'mutants' that were selected and retaining but an occasional one. The cereal crops of the south of Sweden are largely traceable to these mutant individual plants that were discovered, isolated and increased by Prof. Nilsson and his efficient staff.

Prof. Nilsson frankly states that although he has also faithfully followed the work of artificial cross-fertilization since 1904, the product of his labours in that work has thus far been small and the outlook not hopeful when compared with the method of searching for and making use of those individuals that already exist in their excellence and have to some extent proved their superiority on the soil and climate where they

are needed. He is, however, by no means discouraged with his work of crossing artificially. That will be continued by him and his staff as a work of secondary though of much importance, a work worth while doing well on the chance of constructing in one individual, characteristics and qualities not found in available 'mutants.'

The mutants discovered as the result of persistent search, as well as the individual plants that result from crossing artificially, after the type has been fixed, are each planted in a drill. The rows—each row representing the product of a single plant—are seven inches apart and planted to correspond as nearly as possible to field conditions, both as to soil and thickness of seeding. From the crop so produced, it is ascertained whether the type in each row is stable and also which of the individual rows have produced a progeny nearest to the ideal desired. The few superior rows of plants are then increased on larger plots for further comparison and estimate as to yield. All the plots were completely surrounded with a strong-strawed variety of rye of dwarf habit of growth.

One or more of the most promising of these increase plots are again sown on still larger plots, also surrounded by rye, from which larger plots more accurate determinations are made as to yield, strength of straw, quality of grain, rust resistance and maturity. Collateral tests are also made on lighter soils near Malmö and at the substations 5 and 10 degrees north.

Our farmers who have been making a specialty of growing and selecting seed wheat, oats or barley would no doubt welcome any modification in the regulations of this association that would relieve them of some of the careful work that is now required of them at a busy season of the year. Perhaps very few of them would take kindly to additional work such as Prof. Nilsson is doing. But I would suggest that this association gradually incorporate into its regulations the best part of Prof. Nilsson's method. I would strongly advise that the association undertake, so far as it may be able, to provide members, particularly new members, with the best possible foundation stock that has been produced from an individual plant of outstanding merit.

My remembrance of that old adage, 'Prove all things, hold fast to that which is good' precludes me from releasing growers of registered seed, under our conditions and careless practices in handling cereal crops in Canada, from the system of continued selection from year to year. To maintain the purity of variety and type, if for no other reason, the breeding plot or 'hand-selected seed plot' should be maintained. If, as Nilsson and other European breeders contend, the nature and amount of variation from an individual plant is so small from year to year, that even specialists are scarcely able to take advantage of it to secure further improvement, then this association might very well allow its members who are growing wheat, oats and barley, to take their crop from their hand-selected seed plots into their barns and select from the sheaf on wet days and thresh by hand enough good pure seed to sow a quarter acre, or even a two or three acre plot, which should be continued from year to year as a base of supply of pure seeds. That would relieve seed growers of their principal excuse for not continuing with the selection according to the present requirements.

It seems to me, and in that particular I think I have expressed myself at the last two annual meetings of this association, that the work of isolating these individual plants of merit can best be done by men who will spend all or nearly all their time in a study of the characteristics and capabilities of these plant units of one or two kinds of crops. It is true that there are some farmers who are now making a specialty of growing seed and who not only have the ability but will find the time and adopt the proper methods to produce new sorts from individual plants of merit which they may discover. But this is a work which our farmers have a right to expect of the experts who are employed by the federal and provincial governments or other institutions.

Dr. SAUNDERS.—We have, perhaps, gone a little too far, since DeVries first called attention to the fluctuations in the characteristics of plants, in our somewhat enthusiastic adoption of his views. He asks us to observe on the one hand, that fluctuations are inherited, and on the other hand, that they are constantly occurring; two views



which are, to a certain extent, contradictory. We have not found at the experimental farm that an early variety of grain loses its earliness when sown under conditions favourable to a longer period of growth. We have early varieties of wheat, oats and barley which in recent years (when early sowing has been impossible, owing to a late spring) have ripened in about 80 days from the date of sowing, although there was no reason in the nature of the weather why they should not have remained green for a month longer. We have not found that long cultivation of these varieties has made any appreciable difference in their early-ripening habits. No doubt, ultimately, some difference would be produced, but I am inclined to think that it is a question of hundreds of years rather than a few years.

It is interesting to notice that the work on the Dominion experimental farms bears, in certain respects, some analogy to that at Svalöf. The work at both places was commenced at about the same time, but was taken up from entirely different points of view. The dominating idea here—I am speaking only, of course, on the subject of field grains—was to produce new and better varieties by cross-fertilization. The dominating idea at Svalöf was to improve, by selection, those varieties which were already in cultivation. You will see the reason for this difference in the point of view when you remember that at that time, as now, our new districts in the northwest were those which seemed to call for the greatest attention. To meet the needs of those districts, it seemed necessary to produce new varieties, not merely to improve the old sorts. DeVries may say that plenty of variations are found in nature, but it would be far more to the point if he would find, and send to us, the ideal wheat for the peculiar requirements of our great northern areas, which we have been seeking for so many years. Variations do not often occur to such an extent that you can seize upon some striking difference which will exactly meet the conditions for which you are working. If we were endeavouring to improve field crops for Ottawa, perhaps we would have as good success at first by simple selection, but where we are working for new conditions it would be absurd to depend on any other method than cross-fertilization. The Swedish work started with selection as its basis; the work here started with cross-fertilization as its basis—followed of course by selection. In neither case were the results satisfactory because of the use of a defective system of selection. Cross-fertilization followed by mass selection gave us results of some value; but at Svalöf mass selection alone proved very disappointing in its results. Some years afterwards the Svalöf system was changed and our methods were also modified—independently but somewhat later. We did not lose our faith in cross-breeding at all; we only changed the method of selection following cross-breeding. The best method of selection after cross-breeding is to sow every year the seed of each selected plant separately, until a group of plants is obtained in which no variation is perceived. That is, of course, the same method as is now followed at Svalöf, although there it is applied to ordinary varieties. I am ready to admit that cross-fertilization alone, when followed by an imperfect method of selection, is an unsatisfactory method of work. But that does not condemn cross-fertilization, for if we look at the high results obtained when it is followed by proper methods of selection, we see that it has more possibilities in it than selection alone, although perhaps it takes longer to reach the results.

We have done some work in selection without previous cross-breeding. In this way, by selecting individual plants, we have produced Early Red Fife wheat, which ripens about a week earlier than ordinary Red Fife and has its essential characteristics in regard to milling and baking. By cross-fertilization followed by selection, we have produced Marquis wheat, which is so much like Early Red Fife that they could easily be mistaken one for the other in the field or in the mill or in the bakery. It is a question which of these varieties will best meet the conditions in the northwest. Some one may ask, 'If Early Red Fife is better than Marquis, will it not prove that selection is a better method than cross-breeding?' Not at all. Neither Early Red Fife nor Marquis can solve the problem of early varieties. These wheats are only (at the most) ten or twelve days earlier than ordinary Red Fife. We require a variety three weeks earlier. There is no probability that such a wheat could be produced in a century of

further selection from Early Red Fife; whereas among my new cross-bred sorts I have several which show that degree of earliness which is essential for some of our far northern districts, without any material loss in any desirable quality. I may say that in recent years our first cross-bred varieties of wheat, which were selected by mass selection, have been re-selected by the more modern system, and have given us very beautiful and more satisfactory varieties than the original mixtures of related types.

I am glad that the method of selection of single plants is receiving more attention, because I think it is the best method, and I hope the association will look more favourably upon it. In regard to the possibilities of natural cross-fertilization in cereals, I may mention that I have found at least two instances in wheat. Others have been found by other observers; but we have very little idea as to how often it would occur in a field containing a mixture of varieties.

Before closing I wish to refer to the Swedish varieties which we have tested. We have grown nearly all the improved Svalöf strains of cereals; some of them for more than five years at the farm in Ottawa. The one variety of spring wheat which they sent us under the name of Pearl proved entirely unsatisfactory for our conditions. We grew it only two years. Its yield was very small, it was extremely late in ripening, and was susceptible to rust. We therefore gave it up, as it did not appear promising for any other district. I do not mean, of course, to condemn the variety. No doubt it is very good for southern Sweden.

We have grown several of their varieties of two-rowed barley. Primus and Princess we have found rather late and not very high in yield. Swan's Neck has yielded very well, but best of all is Hannchen. This barley has done well with us, and ripens quite early for a two-rowed barley, so that we are making arrangements to introduce and distribute it as soon as possible. In the records for the last five years for Ottawa, it has given a crop of 320 pounds per acre more than any other variety of two-rowed barley we have grown. The Swedish varieties of oats have done quite well. We rejected Whiting after several years' trial, because it did not possess any characteristics which would make it valuable to us, and also the Bell and Black Beauty, which did very poorly. But we still have the Swedish Ligowo, which, however, does not seem to be any better for our conditions than the Ligowo which came from France. The Gold Rain, a yellow oat, has done extremely well and has given about the highest average weight per bushel of all the oats we have grown. Two years ago we obtained a sample of Victory, their latest oat. It has done very well with us.

You will see, therefore, that while some of their varieties seem to be adapted only to their local conditions, others, especially the Hannchen barley and perhaps the Gold Rain and Victory oats, give promise of being valuable to us.

#### ADDRESS BY PROF. W. J. BLACK, PRINCIPAL MANITOBA AGRICULTURAL COLLEGE, WINNIPEG, MAN.

MR. PRESIDENT AND MEMBERS OF THE CANADIAN SEED GROWERS' ASSOCIATION,—I assure you I regard it as a great pleasure to be with you at this time. I regret that I had not the pleasure of being here yesterday, or in previous years; but after hearing the practical papers that have been read, and listening to the discussions which followed it will be something of a very important character indeed that will keep me away from these meetings in future.

I have been greatly impressed by the scope of our work as considered to-day. I am impressed particularly with the splendid increase in the number of men in Canada who are interesting themselves in this work of seed improvement. I am, as a Canadian, delighted to realize that there are so many young men identifying themselves



with the scientific aspect of these problems, so important to the future of this young nation. When we consider that we have in this country about 40,000,000 acres of land yet to be brought under the plough, we begin to realize the wonderful future that is in store for this country. There is great need for scientific work in determining the classes and varieties of grains best suited to make this nation a great and prosperous one. We are in a wonderful sense trustees for posterity, and this association is doing a magnificent work for those who are coming after.

I have been impressed by the wonderful care the men who are interesting themselves in investigation exercise in presenting to us the results of their observations. They inspire us with confidence in themselves and in Canadian methods. For their great care in this and in other respects they deserve our commendation. Sometimes it happens that a farmer who has paid but little attention to the work of the trained investigator feels that there is not enough being done along this line. It seems to me that no opportunity should be lost for arousing our farm operators to enable them to make use of the information which they now possess.

There is another important part of this work, not so directly identified with the scientific aspect as it is with the more practical, and that is the matter of getting the consumer to appreciate what quality means. I spoke to Professor Macoun this afternoon on the question of the potato in Manitoba. We find that the consumer pays very little attention to quality. He does not seem to care very much whether he is getting a good product for his table or not. We find that the grower, realizing that the consumer does not seriously consider quality, is paying more attention to the most productive varieties. I was pleased this afternoon to hear our friend from Waterloo say that seeds of vegetables grown in Canada are the equal of, if not superior to, those grown in other countries. It will be well when we learn more of the productive capabilities of our own country, and when we can impress the people with this idea of improving the quality of our seeds and our products.

I was glad to hear the chief of the Seed Branch say that his department would be prepared to employ, bring to this country, and place at the service of those who wish to go into vegetable seed growing, an expert skilled in this work. The Seed Branch is doing magnificent work for this country. The farmers do not realize the importance of it yet, but they will, I hope, a little later.

I feel, as a member of the board of directors, I have been unable to assist the association as I should; lack of time and other pressing duties have been the reason. I hope I may be able to be with you more in the future.

#### ADDRESS BY MR. THEO. ROSS, CHARLOTTETOWN, P.E.I.

MR. PRESIDENT AND GENTLEMEN,—It is a pleasure to me to be present at this meeting and to speak very briefly of the work the association, in conjunction with the Seed Branch, is doing in our province. This morning Mr. Archibald mentioned the selection of seed corn for early maturity. In our province it is generally supposed our season is not long enough to mature fodder corn, but by only three years selecting of seed of Longfellow corn, one of the members of this association grew a crop that ripened ten days earlier than that grown from the seed of the same variety not specially selected with this end in view, and without any decrease in the quantity harvested per acre. It would be hard to estimate the value of a heavy-producing early-maturing fodder corn to our province, the most important industry of which is dairying.

The Seed Branch has done much to make clear to our farmers the value of good seeds and the members of the association are a base of supply for pure seed of the different varieties. Mr. Thomas Waugh, of North Bedeque, can tell you about that much better than I. He has been an active member of the association since its forma-

tion and his grain is known all over the province. Of ten prizes offered in the fields of standing grain competition in oats and wheat in Prince county, fields that were sown with seed grown by him secured seven.

Again, our provincial Department of Agriculture made inquiry in regard to Island prize winning grain, and it was found that 86 per cent of all Island oats and wheat winning prizes at fairs and exhibitions during the last five years could be traced to seed selected by a member of the Canadian Seed Growers' Association.

Prince Edward Island has now the reputation of growing the very finest quality of seed grains, due to the careful work of members of the Canadian Seed Growers' Association and to the energy and enthusiasm of the Seed Branch.

## PAPERS PRESENTED BY MEMBERS OF THE ASSOCIATION ON THE OCCASION OF THE FIFTH ANNUAL MEETING OF MEMBERS IN THE MARITIME DISTRICT, AMHERST, N.S., DECEMBER 7, 1909.

### THE IMPORTANCE OF CHOOSING SUITABLE VARIETIES AS FOUNDATION STOCK.

*(By Ira L. Rodd, North Milton, P.E.I.)*

Members of the Canadian Seed Growers' Association, I may safely say, already know the importance of choosing suitable varieties as foundation stock. When I became a member of the association, I started with two varieties of side oats, the Black Norway, a very popular oat in our section, and the Black Tartarian, an oat which I knew to have given excellent results for at least one member of our association, Mr. Jas. Marchbank, and from whom I bought my first bag of seed. I determined to test these two varieties to find out which was the more suitable variety for our locality, and also which oat responded the more quickly to selection, before deciding which variety to work with permanently. I selected from both varieties for two successive seasons, also grew the Black Tartarian for two more before I decided in favour of the Norway. Taking one season with another in our part of the Island, I found the Norway a surer cropper, also a nicer looking oat when threshed and always weighing heavier to the bushel, with ready sale for all we could spare, farmers driving fifteen miles for a few bushels of seed.

The Black Tartarian, on the other hand, proved an uncertain oat in our locality, being blighted and rusted two years out of the four, and no matter how good or how pure we had them there was no inquiry for them as seed. I understand that in some parts of the island the Black Tartarian is the heavier and better of the two, so it seems that a variety which proves a success in one place may prove a failure in another and vice versa, hence the importance of choosing a suitable variety as foundation stock. In starting to select any kind of crop I would like to test two or three varieties before I determined on the one I would choose, for therein often lies the difference between success and failure.

### SOME OBSERVATIONS DURING SEVERAL YEARS OF SEED SELECTION.

*(By Robert McKay, Millville, N.S.)*

In 1900 I advised one of my boys to enter the Macdonald-Robertson seed grain competition and see what could be done in Pictou county with Red Fife wheat. Having an acre of almost virgin soil, stony but rich in humus, he set to work.

The first year we very carefully selected one hundred large heads. These heads only averaged thirty-four seeds, but brought us third prize. This gave the boy courage,



so next year he went at it in better spirits. The seed bed this year was good, but no better than that of 1900. Our 100 heads this year averaged 41 grains to the head, so this was quite an improvement. The third year the plot was on root ground, but was no better than in previous years and the 100 heads averaged 51 grains to the head. Our increase in yield was just as marked. The first year, six and one half bushels were produced on the quarter acre; the second year ten, and the third year twelve. I observed that the heads grew longer and much stouter, some heads showing spikelets with four and five grains. This was the same variety of wheat as the writer has now on exhibition at the present fair. Another observation is that the wheat is becoming established in character.

It is asked sometimes if it will continue to show improvement. Well, it can only become perfect.

Still another observation is that if it gets a backset, as it did four years ago, it is only waiting for a chance to get back to itself again. Mr. Waugh set me thinking by a statement he made that, in his opinion, we should subject our seed to a strong current of wind before sowing. My old grandfather who lived on the farm I now occupy made the remark one evening that he had sowed the same variety of oats for fifty years and they were just as good as when he got them first. One of his sons remarked, 'Yes, but father uses the big fanners,' meaning the wind. By holding a sieve as high as his head, when the wind was blowing through the barn doors, he would pour the grain on a thin wide sheet and away would go the chaff and light grains. When he was done, he had a long pile of grain, which he made two parts of, keeping the best end for seed and meal, the other part for feed. Our work with oats and barley has given us quite as satisfactory results as has that with wheat and continues to be of great interest to us.

#### SOME RESULTS FROM SEED SELECTION.

*(By James Marchbank, New Annan, P.E.I.)*

My experience in selecting seed grain, though not very extensive, has not been without results. We must have a grain that is true to name to begin with; then we should watch its improvement, sowing on the best soil available—summer-fallow, root ground or early ploughed sod, well worked and prepared. We treat our oats to destroy smut, spreading the grain out on a floor, sprinkling it with a solution of formaldehyde, shovelling it over until all is damp, then covering it up over night to prevent too rapid evaporation of the moisture.

In harvesting it is always best to let grain get thoroughly ripe when intended for seed purposes, although this is often hard to do, as some varieties, especially the side oats, when grown on strong land are apt to get broken down. In the first few years of selection, we found greater improvement than after several years, but we believe the progress is still going on. Again, some years seem to be less favourable than others, the crop falling short of previous records, but the breed is still there and the next year may be the best yet.

Keeping the seed pure from other varieties is sometimes hard. We find hand picking an excellent way of maintaining the purity. The using of a fanning mill is very desirable, although some of the largest grains go out in the tailings.

As regards sales, we cannot supply the demand for seed of the varieties selected; the local demand is increasing, as well as that from other provinces.

The provincial seed fairs are good educators for farmers, as selected seed always shows up well in the prize winners' lists.

I would not advise any one to operate with more than one variety unless they have plenty of help, as there is considerable work in connection with it. Have one seed plot; do the work well; select as near as possible the type of head you have in mind; keep the seed clean, and you will have results which will pay you well for your trouble.

## DOES IT PAY TO OPERATE A SPECIAL SEED PLOT?

(By Richard Creed, Albion, P.E.I.)

At first thought we are inclined to say that it does not pay the farmer to operate a seed plot. There are three reasons which may come to our mind in support of this statement. The first is that the time which the farmer has at his disposal will not allow him to operate a seed plot. The second is that, in order to operate such a plot, it would be necessary to hire extra help, and help being scarce in many instances, it cannot be obtained when required. The third reason is that the increased yield and purity will not pay for the time required. In reply to these arguments our experience shows that it does not take much longer to prepare and sow the seed plot than is required in the case of any other area of equal size. There is, undoubtedly, a great rush of work at harvest time, so the grower should have a careful plan of procedure worked out so as to distribute the work as far as possible. My plan is to sow the oats and barley plots as early as soil and weather conditions will permit. By so doing these plots are ripe and the selection of heads made before the rest of the crop is ready to harvest. In the case of wheat I find I can sow my plot at the time I sow the rest of the crop and be able to cut the general crop first. When this is drying in the field, I have time to select heads from the plot. I think that almost any farmer can find time to operate at least one seed plot by following the plan I have outlined. I find that I can select enough seed in one day to sow next year's seed plot. When the plot is sown before the rest of the crop it is most convenient to have it located on one side of the field, but when it is sown the same day as the general crop it may be sown near the middle of the field in a long narrow strip. In either case, it will not be much trouble to cut around it at harvest. We always keep some of our lofts vacant for the storing of straw and these make an excellent place for storing the sheaves from the seed plots. These sheaves may be threshed first and by having a few bags ready, it will only take a few minutes to get the plot work out of the way. I am sure when a farmer sees the yield of extra good seed from his plot, he will feel satisfied that his time has been well spent and that he has been well repaid for the time it has required and the energy he has exerted. As for the actual time and what that time is worth, we will take a seed plot of oats as an illustration:—

Extra time required in the spring to prepare and sow a seed plot, 1 hour. . . . .	\$0 35
Time required at harvest to select heads, 1 day. . . . .	1 00
Extra time for storing and threshing (about 1 hour). . . . .	0 15

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Total extra expense in operating a seed plot . . . . . \$1 50

I know that no farmer would part with this extra good seed for the sake of a dollar and a half. The yield on our seed plot has been four bushels more grain than that realized off a quarter acre sown with unselected seed, while the quality has been improved. The value of the oats will also be increased from forty cents to sixty cents per bushel.

On this basis the extra yield will be worth . . . . .	\$2 40
If the quarter acre plot yielded ten bushels, the increased value at 20 cents per bushel increase would be . . . . .	2 00
* Total. . . . .	\$4 40
Extra expense of operating seed plot . . . . .	1 50

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Balance in favour of selected seed plot. . . . . \$2 90

I have also raised hundreds of bushels of selected oats, which weighed forty-two pounds per bushel. The average yield of oats on Prince Edward Island is about thirty-six bushels per acre, and the average price about forty cents per bushel. If a farmer grows ten acres of oats, he can realize from twenty to forty bushels more by operating



a seed plot. Nor has it ended here, as once you get a farmer interested enough to grow good seed, he will use all the means in his power to keep the weeds out of his farm. This may mean hundreds of dollars to him in the years to come.

#### A MEANS OF INCREASING AGRICULTURAL PRODUCTION.

(By E. D. Eddy, Seed Branch, Ottawa.)

Farm crops constitute the barometer of business activity. When crops are good the whole country prospers, but when farmers have hard times there is a general business depression, international trade falls off, manufactories work on short hours, labour cannot get employment and even the local merchant finds his business curtailed. The reason for this is apparent when we look at the comparative value of farm products and the output of other industries. According to the census of 1901, the combined product of the mines and forests of the maritime provinces was \$16,401,021, whereas in the same year the value of the farm products amounted to \$36,667,294. The amount invested in land, buildings and stock was \$154,529,931. According to the estimates of the Department of Agriculture, the value of the field crops in 1909 amounts to \$47,739,000, or approximately \$11,000,000 more than the total farm products in 1901.

This is an excellent showing and the farmers of the maritime provinces have reason to be proud of it, but we must remember that the increase is largely due to the higher market values. The farmers are doing well, but it does not follow that they are doing their best, and I would like to point out one line where improvement may be made.

We have noted the importance of agriculture in relation to the commercial life of the country. The farmer's success depends on the yield and quality of the crop, so that the vital problem for farmers, and therefore for the whole country is, Are the field crops as large and of as good a quality as they might be? If not, can they be improved, and how?

There are many ways that might be suggested, but the one for our special consideration now is the use of better seed. Our first inquiry is, What sort of seed is being used? During the seed inspection work last spring it was found that some farmers were buying oats for seed that contained nearly 300 noxious weed seeds per pound. Not only were these oats full of weed seeds, but they were unnamed and perhaps mixed varieties. These, of course, are extreme cases, and not many farmers would use such seed, but there is much room for improvement in the general practice. In the average field of grain we find more or less mixture of kinds and varieties as well as great variation in the individual plants and heads. Some plants are strong and vigorous, bearing uniform and well-developed heads, while others are weak and straggling, bearing small heads of inferior quality. What does the average farmer do with this crop? He cuts and threshes it all together and often sows it without even fanning mill selection, to remove weed seeds and small and light grain. By this method an equal chance is given the good, bad and indifferent seed to propagate its kind in the succeeding crop.

The weakness of this system is apparent, and the object of the Canadian Seed Growers' Association plan of seed improvement is to correct this evil and allow only seed from plants of desirable type to be used for the succeeding crop. It is unnecessary to go into the details of the system now, as it is the general principle that we want to bring out. It is sufficient to say that the members of the association have been able to bring about marked improvement in their crops, both in yield and quality. Taking figures supplied by members as a basis, it is estimated that the value of the average grain crop could be increased by from 15 per cent to 25 per cent, and potatoes by from 30 per cent to 50 per cent, by proper seed selection.

To be conservative, let us assume that the value of field crops could be increased by 15 per cent, and see what this means in general application to the maritime provinces. As stated before, the value of the field crops in 1909 was \$47,739,000. Fifteen

per cent added to this means \$7,160,850, which the farmers of the maritime provinces are annually losing, or rather failing to collect, through neglecting this one phase of their work. But you say, 'We cannot afford the time.' The answer is that you can not afford not to take the time.

But while this work is not receiving the attention it deserves, there is evidence of an awakening to its importance and we may reasonably expect a rapid improvement. During the last few years the field crop competitions have done a great deal to create an interest in high class seed. These competitions have also furnished the strongest possible evidence of the value of the seed plot in raising the standard of crops, for a very large proportion of the prize-winning fields were grown from seeds produced by members of the Canadian Seed Growers' Association. The annual seed fairs and the institute meetings are also doing much along this line, so that the farmers generally seem to have made a good start towards collecting that \$7,000,000 from nature. Much has been done, but much remains to do, and farmers owe it to themselves and to their country to pay more attention to this vital question of seed selection, and thus add to their own income and happiness and at the same time increase the general wealth and business activity of the country in which they live.

#### PAPERS PRESENTED BY MEMBERS OF THE ASSOCIATION AT THE ANNUAL MEETING OF MEMBERS IN THE ONTARIO DISTRICT, GUELPH, ONT., DECEMBER 9, 1909.

##### SOME RESULTS OBTAINED IN THE WORK OF CORN IMPROVEMENT AND THE DEMAND FOR HIGH CLASS SEED CORN.

*(By L. D. Hankinson, Grovesend, Ont.)*

Corn breeding in Ontario is as yet in its infancy. There are few men who appreciate the results that may be achieved by thought and time, judiciously spent, in the selecting of seed for our future crops. Yet it is surprising what the outcome of a little time and attention spent in this way would mean to the farmers of our country.

I desire to point out to you, as briefly as possible, some of the results that I have achieved through my short experience as a corn breeder.

In all lines of production there are certain underlying principles which govern our progress. These principles in some instances are fairly well understood; in others they are somewhat obscure. This is especially so in plant breeding. With plants, one must grow many generations before any conclusion can be drawn and before these conclusions can be declared a certainty. When corn was first considered by the colonists to be valuable, we are told that they carefully selected and laid aside a portion expressly for planting.

The improvement of corn is possible owing to the existence of two natural laws, viz.: the law of variation and the law of heredity. The law of variation gives rise to multitudes of fluctuations and yet in spite of these variations, the second law, the law of heredity or 'Like begets like' predominates. The breeder makes his selection with the expectation that the characters selected will be conveyed to the offspring in part at least.

My experience as a corn breeder has been extended over a period of but five years, yet I am certain that I have made sufficient improvement in the particular variety I have been working with to more than recompense me for the time and trouble spent in trying to raise the standard of that particular variety.



I was persuaded by my friend, Mr. Newman, five years ago to undertake this line in connection with our association, and, working on the principles outlined, I have been able to produce a strain of corn that has become very productive and true to type.

I shall very briefly outline some of the outstanding results of those five years' operations. I find that five years of careful selection has very materially increased the average yield of grain per acre. This I consider the foremost object we all have in view in our work of plant breeding.

I find from my notes that in 1904, from an area of 10 acres, I realized an average of 90 bushels of ears per acre, while this year, which was not altogether favourable for corn, we realized an average yield of 125 bushels over an area of 20 acres. Another object I have had in view in my work of corn breeding has been to insure earliness. In my opinion, an ideal corn is (1) one that will mature in time to avoid frosts, (2) one that will produce large leafy stalks, (3) one that will produce ears of uniform type and as large as conditions will permit. For the majority of Ontario districts too much emphasis cannot be placed on the first requirement. Too many farmers to-day are tempting Providence by raising varieties that are too late for their conditions.

From my experience I find that the earliness of any corn can be influenced materially by selection. My own results bear me out in this statement. I find that by selecting early maturing ears from standing plants I have lessened the period originally required for corn to mature in by at least five days in as many years.

Another important feature of this work of corn breeding is the fixation of type. While this is not so important from a commercial standpoint, yet from a breeder's standpoint it is of prime consideration. To attain a uniformly good type the main thing is to start right, have the desired type or standard constantly fixed in mind. I believe this can best be obtained by selecting uniform ears and using only seed from the more central portion of the cobs.

In referring to my field notes, I find another way by which the productiveness of our corn crop has been influenced, viz.: by decreasing the number of barren stalks. In 1904, my seed plot showed something like 18 per cent of barren stalks. This has steadily decreased until this year's crop showed only 7 per cent. This, I think, was attained chiefly by systematically detasseling all weak and barren stalks before the pollen was shed. There is one thing about this line of work that has appealed strongly to me, and that is that it increases the incentive to work our farm better.

The demand for high-class seed is yet in its infancy. The farmers of Ontario are just awaking to the fact that plant breeding has just as great possibilities as has animal breeding. The demand for high-class Canadian grown seed has never been so great as now. Heretofore, the bulk of our seed corn has been imported from the United States, but now our farmers realize that they need a home grown acclimatized seed.

Dairying, our foremost industry, is progressing by leaps and bounds, and with it corn growing must increase, for the simple reason that corn in its many forms is essential to profitable feeding of dairy cows. In our own country the acreage of corn has increased by one-half in the past four years. In conversation with a number of our local seed merchants, I was told that their sales last year were more than double those of any previous year. Progressive farmers to-day are becoming more and more particular regarding their seed. Yet much work needs to be done in educating them how to select the proper types. Many serious losses have been incurred by farmers selecting the wrong sorts.

I predict a grand future for the breeder of high-class seed corn. The farmers of southwestern Ontario practically control the output for Ontario, and they have manifested a spirit of progressiveness by the organization of the Ontario Corn Growers' Association, an organization which is doing much to meet the needs of the farmer along these lines.

## SOME RESULTS OBTAINED IN THE IMPROVEMENT OF THE POTATO.

(By Alfred Hutchinson, Mount Forest, Ont.)

The first attempts to improve the potato appear to have been about the middle of the last century. In 1845-46 the late blight almost destroyed the potato crop of Great Britain, and it looked as if the potato was doomed to extinction. But for some years prior to this, a Mr. Wm. Paterson had been experimenting in raising new varieties, and shortly afterwards he brought out 'Paterson's Victoria,' a splendid cropper, of good quality, and practically immune from disease. This was probably the first 'rot-proof' variety ever introduced. During the following 50 years, a large number of new varieties were put on the market. A few proved of real merit and largely superseded the old and worn out kinds, but a great number were little or no better than the old ones and soon disappeared. In the course of time, it became apparent that potatoes deteriorate; they became less vigorous, less productive and more susceptible to blights and rot.

Prof. Robertson was the first to press on the notice of the farmers of Canada the possibilities of improvement by selection and the members of the Canadian Seed Growers' Association are pioneers in this work.

As illustrating how potatoes 'run out' or deteriorate: We dug three strains of Empire State potatoes last fall which I shall call Nos. 1, 2 and 3, each produced originally from one potato. No. 1 was the product of 17 lbs. of seed; No. 2 was produced from 16 lbs., and No. 3 from 18½ lbs. Nos. 1 and 3 were large in size, there being almost no small ones, and yielded at the rate of 205 bushels per acre. No. 2 were medium and small in size, smooth and even in shape and very full of eyes, yielding at the rate of 161 bushels per acre. On account of the characteristics of No. 2, it planted much longer rows than did either of the other two strains, but its total yield was 10 lbs. less. It is obvious that if these three strains were mixed and used for seed, that No. 2 would gradually gain on the two more productive strains, not by its productiveness, but by virtue of its making more seed, cutting to greater advantage and thus planting more ground than the better ones. Add to this the occasional culls that would naturally develop from Nos. 1 and 3, and it can easily be seen that as time passed, deterioration would become more rapid and we should say that the variety was 'running out.'

But we have another factor to reckon with, which we may call natural deterioration. We are often advised to use medium sized tubers for seed, but far too often we use small ones. In the case of the three strains above referred to, such a practice would result in practically all the tubers chosen coming from No. 2, the more productive strains being sold for consumption. In two years the 205 bushels per acre strain would be practically eliminated. Can we wonder at the deterioration of our potatoes? Size is no criterion of the fitness of the tuber for planting. The best seed is the product of the most vigorous and productive parent, and its individual size is a matter of comparatively little moment.

It is now three years since I commenced to improve the Empire State potato by selection, and although I cannot say whether I have obtained any measure of blight resistance, I have achieved most encouraging success in increasing the yield.

In the spring of 1907 I chose 125 medium sized tubers of as even type as possible. These were planted, whole, in rows 30 inches apart and 24 inches apart in the row. In the fall each hill was dug separately and weighed. The season was a very poor one for potatoes and especially for this variety, as they ripened prematurely on account of hot dry weather. However, we kept the product of the best 18 hills, and in 1908 these were planted in 18 rows of 8 hills to the row, using one whole potato to plant each hill as before, except where less than 8 potatoes had been produced in the selected hill, when one or more were split to make the desired number. The plot was located near one side of a 4-acre field of potatoes, the rows being 30 inches apart and the hills 24 inches apart in the row. Manure and cultivation were exactly the same as for the balance of the field. Quite early in the season some very striking features developed. There was most perfect uniformity of the plants in each row, but very great differences



between the rows. So great was the difference between many of them that one would suppose them to be distinct varieties. Digging revealed equal uniformity in the character of the tubers and in weight of each hill in each row, but great differences between the different rows. The yield varied from  $8\frac{1}{2}$  lbs. for the poorest to  $18\frac{1}{2}$  lbs. for the best 8 hills. The season was one of the best for potatoes we have had in recent years, and my main crop of Empire State yielded 212 bushels per acre over 3 acres. The yield of selected seed plots, taken as a whole, was at the rate of 245 bushels per acre, an increase of 33 bushels, but the best row yielded at the rate of 358 bushels per acre, being 146 bushels more than the unselected crop, notwithstanding the fact that the hills were 24 inches apart, as against 15 inches in the main crop.

For 1909 planting I discarded the product of the two poorest rows; the product of the next seven was mixed and used to plant a general seed plot. The seven best lots were kept distinct and planted in seven rows side by side. The sets this year, excepting a few kept for further selection, were cut in the ordinary way and planted as the main crop, except that they were placed 18 inches apart, as against 14 or 15 inches for the others. Manuring and cultivation were again identical with that given the rest of the field. As in the previous season, there was a wonderful uniformity in growth of vine, each now being exactly the same from end to end, but no two rows were alike, in several the differences being most striking. There was a difference in colour, some being of darker shade than others, some rows blossomed freely, being a mass of white from end to end, one or two rows showed no blossom at all, and two rows showed a stouter, more erect growth of vine than the rest. Were the plants mixed up, these differences would probably pass unnoticed, but when massed in this way and grown side by side they were quite striking. When the first frost came, the whole field of potatoes was still green. Inspection seven days later showed one row still standing erect, and the lower leaves green and healthy, while all the rest of the field, 4 acres, comprising some 6 different kinds, was brown and dead. Just what this indicates I am not prepared to say at present.

In order that it may be easily seen how the yielding qualities of the different strains were reproduced, I will give in the following table the weight of the product of each row in 1908, and in the opposite column the yield of that strain for 1909. It should be remembered that this year (1909) was one of the poorest in the past eight years for potatoes, the yield being only about two-thirds of an average crop.

Row.	Yield 1908.	Yield 1909.
No. 1.....	17 lbs.....	200 bushels per acre.
No. 2.....	16 ".....	161 " "
No. 3.....	$18\frac{1}{2}$ ".....	210 " "
No. 4.....	$13\frac{3}{4}$ ".....	126 " "
No. 5.....	16 ".....	195 " "
No. 6.....	14 ".....	165 " "
No. 7.....	$13\frac{1}{2}$ ".....	170 " "
	Average of seven rows of $11\frac{1}{2}$ lbs..	144 " "

The average yield of the seven best selections was 175 bushels, as against 144 bushels for the seven ordinary ones, under uniform conditions.

On one side of these plots, I grew Rural New Yorker which yielded 124 bushels per acre. On the other side there was nearly half an acre of Delaware and Uncle Sam; these two averaged at the rate of 125 bushels per acre. Unfortunately my main crop of Empire State was a partial failure, owing to some defect in the seed, so was of no

use for comparative purposes, but assuming that the Rural New Yorker represents the average of the main crop, the best selection has given an increase in yield amounting to 86 bushels per acre in a year when the crop yield was abnormally low. Last year, with an abnormally high yield, it gave an increase of 146 bushels. I think it must be acknowledged that results so far have been decidedly encouraging. I can show by figures the differences between the various strains in yield only. There are other differences which must be seen to be appreciated. We know that the yield is very largely influenced by climatic conditions, and that very frequently the variety that gives the largest return in one kind of season, may not do nearly so well in another, when weather conditions are different. But when we see all other characteristics accurately reproduced from year to year, I think we may conclude that we are working on a solid foundation. It is indeed a vast field with almost unlimited possibilities and opportunities undreamed of.

The very short experience that I have had in this work has convinced me beyond a doubt, that not only we can regain and retain all the original qualities of our cultivated crops, but that we can improve upon them, by a rational method of selection, and who can foretell what the limits of this improvement may be?

#### THE CHOICE OF FOUNDATION STOCK AND ITS IMPORTANCE.

*(By Chester Nicholson, Mount Forest, Ont.)*

For many years the choice of foundation stock in our live stock industry has received great attention, but it is only recently that we have learned of the great importance of suitable foundation stock in the improvement of our crops.

Plants differ in their characteristics just as animals do. As in animal life, so it is in plant life—like produces like. This might be more truly stated by saying that 'like tends to produce like,' for there is a continual variation in all life. We cannot wholly understand the causes of variation, although one of the chief factors is undoubtedly environment. It is by means of this law of variation that we are able to improve our seed. By continuous selection we can fix in our cultivated crops desirable characteristics, such as productiveness, strength of straw, resistance to disease, &c. It is through selection that we have the Dawson's Golden Chaff fall wheat and No. 21 barley, each variety having originated from a single plant which showed superiority over the entire crop in which it was growing. In our work in the improvement of our crops, probably the most important agency is the artful selecting of the seed. By continuous and systematic seed selection great results have been accomplished. In nature selection is continually taking place through what might be called 'natural selection,' or the 'survival of the fittest.' In plant life and in animal life, there is a struggle for existence going on continually. In nature we find the strongest live and the weakest die, or in other words, those plants most fitted for their surroundings survive. This is why we have to eternally fight weeds, as they possess characteristics, such as productiveness, vitality, &c., which enable them to survive and often to greatly decrease the yields from our cultivated crops. Thus by aiding nature we can do a great deal towards preserving and improving upon the desirable characteristics of our farm crops.

Productiveness with good quality is the most important point we have to consider in plant improvement. The choosing of a variety is one of the most important features to consider. It is rather difficult to say which variety of any particular crop is the best suited for a locality. One variety will do best in one locality, while another variety will do best in another locality. I am working on the Banner variety of oats, as I have found by experiment that this variety does best in my district. At the experimental farm, Guelph, the Joannette and the Siberian have given best results, yielding over 15 bushels more per acre than the Black Tartarian and some other varieties. At the Ottawa station, the 20th Century stands first, while Joannette stands 23rd; the 20th Century yielding 24 bushels 20 lbs. more per acre than Joannette, and so on with the different varieties.



The only way in which we can determine the varieties that are best adapted to each district is to test them side by side. I know of no way in which to carry on careful and accurate tests of varieties to greater advantage than through the medium of the Experimental Union. According to the last report of the union, I notice that experiments are now being conducted on 4,420 different farms in Ontario. The work of the union is carefully and systematically planned so that it is not difficult to make accurate tests.

The size of seed is also important. It is generally known that the largest, plump-seed always give best results. During the past three years I have grown No. 21 barley which has taken first prize each year at our fair at Mount Forest. The crop of barley grown each year from this selected barley has shown a marked improvement over the crops grown from seed not so well selected. According to tests at the experimental farm at Guelph results show that in every instance the largest seed produced the largest yields, and in the case of oats, where continuous selections were made for twelve years from heavy plump seed and from light seed, there was an average annual difference the first four years of 10.4 bushels per acre. During the next four years, there was an annual difference of 15.8 bushels per acre, and in the last four years there was an annual difference of 22.4 bushels per acre. In every year the large, plump seed produced a greater yield and a heavier weight per measured bushel than did the light seed, and the difference between the two selections became greater with each succeeding year.

Weather conditions affect the quality of seed. The weather is something we cannot control, but we can provide against unfavourable seasons by preparing the soil to make conditions favourable to the production of good seed. The first requirement of any soil for the production of good seed is good drainage, as well drained land is necessary for the proper rotation of crops.

Well drained land may be put under hoed crops, thus facilitating the eradication of weeds. Well drained land may be worked earlier in the spring so that seeding may be done earlier and better crops of heavy grain assured as grain ripens more evenly on land uniformly well drained. Crops, like animals, require an abundance of food for proper growth, hence a soil well supplied with plant food is necessary. The fertility of the soil can be maintained or increased by good drainage, short rotations, the growing of clover and hoed crops to clean the land.

The work of this association calls for attention to details. We cannot afford to neglect any feature of the work. We may sow the best of seed, but if the soil is undrained or otherwise unsuitable for the production of good seed, our work will be in vain. With good seed properly sown in soil well prepared, great results may be obtained in the improvement of our crop by selection.

#### TEN YEARS' EXPERIENCE IN THE GROWING OF SPRING WHEAT IN GLENGARRY COUNTY, ONT.

*(By Robert McKay, Maxville, Ont.)*

Too much encouragement cannot be given the cause of educating the agricultural districts into adopting a systematic plan of selecting seeds for the production of cereal crops.

Though ten years have expired since I first became interested in seed improvement, I did not fully realize at that time the vast importance of such a movement.

Before dealing directly with the subject, I wish to say that owing to physical conditions I am not a very extensive grower of spring wheat, as I consider quality to be more essential and more worthy to be sought after than quantity; therefore, I directed my efforts in search of the former, and did not concern myself greatly with the latter.

In the year 1900, I associated myself with what was known as the 'Macdonald-Robertson Seed Grain Competition.' I received from the department at Ottawa one-half bushel of spring wheat of the Red Fife variety. I sowed the half bushel on a quarter of an acre plot which was in a very good state of cultivation, and watched with interest the outcome of my new experiment.

In due time the crop became matured and was what I thought a banner one. Then came the work of selection. I selected one hundred of the largest heads and sent them to the department at Ottawa, as required by the rules of the competition, and fifty pounds of heads which I retained to continue the work. On receiving the list of prize-winners I found that I stood thirteenth and that those heads that were the finest in the plot averaged but thirty kernels per head. The next spring I prepared a field in a fair state of cultivation after a cultivated crop, and sowed the hand selected seed in a quarter of acre plot in a corner of the field, while the remainder of the field was sown with the seed produced from my last year's plot.

The season was a very favourable one and the crop ripened uniformly, but a great contrast was visible between my plot and the field crop. The field crop's average height was about three feet, the straw was weak and the heads were of many types and ranged from fifteen to thirty kernels to the head. In my plot, I found the average height to be three feet six inches, the straw was strong and the heads ranged from twenty-five to fifty kernels per head, with an increase in weight which placed me in third standing in the yearly competition.

This finished the 'Macdonald-Robertson Seed Grain Competition,' to which we can candidly give the credit of giving birth to the Canadian Seed Growers' Association, of which association I have the honour to be among the chartered and active members. I continued the work of selection under the rules of the above association, and found at the end of my third year's operations I had made an increase of fifteen per cent in the kernels per head, while the increase in yield during the three years was twenty-six per cent.

During its growing period the crop took a rich, dark colour, and showed a decided resistance to disease.

It is unnecessary for me to give in minute details an account of my work during the last seven years, as the first three years of selection raised the seed to such a high standard of quality that the object of the work now was to hold it at that standard.

The season of 1908 was a very unfavourable one. The spring was wet and late, and later on a severe drought set in which rendered the grain crop in this district a very delicate one. Though the straw on my plot was rather weak and the heads not up to the average of former years in appearance, yet the climatic changes apparently have not deteriorated the vitality of the seed, as my plot this year produced some of the most magnificent specimens I ever saw, a sheaf of eight hundred heads averaging sixty-five kernels per head having been selected from an eighth of an acre. This goes to show that selected seed is more vigorous and will endure more reverse climatic conditions than will common grown seed.

In my work of selection I use every precaution against undesirable specimens being selected, such as those that are not true to type, lacking in vigour or given too much to stooling. When entering the field for the purpose of selecting, one must have in mind a true conception of ideal plants and then select only such plants as conform to that ideal.

It will be noticed by what has been stated in the former part of this paper, how quickly grain responds to selection. A single year's selection by untrained hands was sufficient to create a difference in growth clearly perceptible to the eye. Those who pay the proper attention and who carefully observe the growing of their crops, know how large is the proportion of undesirable heads or plants in the average field of grain. There are small, unsymmetrical and even diseased specimens that may be easily detected, and the omission of these will eventually increase the vitality of the seed for the following crop. I am sure the advantages derived from the continuous use of good, clean seed raised to a high state of vitality cannot be over estimated and these are only some of the qualities and benefits obtained by hand selection.

I may say that the work of selection is not only interesting and beneficial, but it is also educational. It inspires an interest in the study of plant life which cultivates the intellect and renders one more capable of higher accomplishments in farm life.



PAPERS PRESENTED BY MEMBERS OF THE ASSOCIATION ON THE  
OCCASION OF THE SECOND ANNUAL MEETING OF MEMBERS IN  
THE MANITOBA DISTRICT, BRANDON, MAN., MARCH 9, 1910.

GLEANINGS FROM FIELD WORK IN THE INSPECTION OF SEED PLOTS OF FELLOW MEMBERS.

(By Geo. H. Bradshaw, Morden, Man.)

It was my privilege the past season to inspect the seed plots of the members of the Canadian Seed Growers' Association in the province of Manitoba, and some of the things I learned and some of the observations I made while engaged in that very congenial work I shall set down here in the hope that they will be of interest, and possibly of benefit, to those who recognize in the Canadian Seed Growers' Association one of the factors in the advancement of agriculture.

The members of the association in Manitoba are few in numbers, but what they lack in numbers is made up in enthusiasm and devotion to the work. Possibly the most encouraging, the most gratifying feature of the work in Manitoba is the zeal and earnestness with which they have taken up the work of plant improvement. Recognizing the need of better seed and purer seed, and finding in the plan of the Canadian Seed Growers' Association a practical way of attaining these ends, they are working away patiently, hopefully and with a gratifying measure of success. They are, I think, animated with the spirit of the association, namely, improvement, always improvement, and find the work, as such men are sure to find it, congenial and fascinating. The plan of improvement by selection, always looking for the most perfect types, is a plan that appeals to the man or woman who by nature craves for higher ideals, and the work I saw while on this trip of inspection leaves no shadow of doubt in my mind that the plan of the Canadian Seed Growers' Association for improving crops by hand selection is sound and practical.

While travelling over the province I could not help regretting that more men were not engaged in this work. Large districts were traversed without a solitary member of the association, while on every hand the need for local sources of supply of pure, high grade seed was plainly evident. Fields of grain containing a mixture of different varieties, or of different kinds, were the common rule, which clearly indicated the need of a few more enterprising members of the association to increase the supply of desirable seed.

I might here relate an incident of my trip to illustrate how few farmers grow only pure, high grade seed. I had started out one day on a long drive to visit a member with a fine record for good work, and the man who drove me did not know the country very well, and finally concluded he was out of his bearings. I had been watching the crops on either side of the road, as was my custom, when suddenly we came to a farm where the fields of grain were all pure and all true to type and of such fine quality that I straightway informed my driver that he was on the right road and at the very farm I wished to visit. We turned in and found it was the farm all right. The good work this member has done was so plainly evident that I, a stranger driving along the road, was able to tell his farm by the purity and excellence of his crops.

In every district where a member of the association was actively operating, the influence of his good work was plainly evident in the crops of other farmers in that district. They had availed themselves of the opportunity to get improved seed and the improvement in their crops was very noticeable to one whose eye was trained to discriminate between crops possessing the ideals set by the Canadian Seed Growers' Association, and the ordinary crops of the country.

But while there is an opportunity and a need for more members of the association to engage in the active work of crop improvement by hand selection, it might be well to point out that success depends on certain qualifications. The member who achieves success must delight in improvement, he must have fixed in his mind a high type of excellence and must have the patience to work away for years, if need be, to attain results. It is essentially work that demands exactness, care, thought and perseverance; but if these requisites are put into the work there will be a reward in satisfaction and increased knowledge, as well as bigger and better crops and greater financial returns.

The ambition among members of the association to grow crops of big yields and high quality, I found, had been the means of leading them to give a close and intelligent study of the different questions that enter into the cultivation of the soil. They have learned to recognize that fertility, conservation of moisture and rotation are important factors in the production of high grade seed. In other words, the successful grower has come to realize that seed selection and the best cultural methods go together. So I think the Canadian Seed Growers' Association may justly claim that its influence for good has extended beyond the bounds of improved crops by seed selection alone. Like other good influences it goes on in ever widening circles until it affects the whole system of agriculture.

There are some questions of local interest to the members of the association in Manitoba which, I think, may be referred to here. I found that some members were not very clearly decided what previous treatment of soil gave the best conditions for the growing of ideal plots. In some cases a piece of virgin soil was selected, and while this had the merit generally of being clean, it frequently grew too rank. Others sowed the plots on well worked summer fallow or on an exceptionally rich piece of land, and the growth in such cases was nearly always too rank and soft. The heads were generally a phenomenal length but poorly filled, and the sample spoiled by a mixture of shrunken grains. From my observations I came to the conclusion that a piece of corn or root land which had not been ploughed or otherwise loosened up, or a piece of sod land that had been worked up into a good seed bed gave the finest types of heads. The stand was not so heavy as on fallow land or virgin soil, but was stiffer and stronger and produced heads of good size and well filled with grain of good quality. Some members were greatly disappointed because in their desire to have plots show a thick, heavy stand, they had selected the richest piece of land they had for the purpose. The result was a great crop of straw without grain to correspond. I should say in selecting a piece of land for the seed plots, the great aim and the first consideration should be to find a piece that is likely to grow a fine type of head in preference to a rank growth of straw.

I found some members who showed rare skill and judgment in fixing the type of head they wished to predominate in their crops, and in some such cases where the work had been carried on long enough to get results, those results were a tribute alike to the skill of the grower, and to the value of seed selection with definite ends in view. I found some other members, however, who were after the longest and biggest heads regardless of their other qualities. My experience and observations convince me that this is a mistake. The head of fair length, compact and filled from top to bottom with plump kernels is my ideal.

There were very few farms visited that could boast of absolute freedom from wild oats and some of the other noxious weeds. Wild oats are undoubtedly proving a menace to the seed grower on account of the difficulty of getting them entirely out of the soil, and also the impossibility of cleaning them out of the grain to fit it for sale as pure seed. This opens up the whole question of farming as it is generally practised in the province, and is a hint to the progressive farmer to change his system to one where stock and rotation find a place.

A word might also be said about the market for high grade seed. I found on inquiry of members during my trip that the selling of their product, where they had grain of the right quality to offer, was the least difficult part of the business. There



was a demand for high-class seed that it was impossible to satisfy and at prices that were quite remunerative. There is a growing appreciation of the importance of selected seed, particularly where the work of selection has been carried on by an intelligent and skilful grower, and as the merits of such seed become better and more widely known the demand will be still greater. All of which, it seems to me, should offer a strong inducement to a few good men here and there throughout the province to take up this work as a practical part of their farming operations.

There is only one member (Mr. Harold Orchard, of Lintrathen) engaged in improving potatoes under the rules of the Canadian Seed Growers' Association. His plots were very fine and much credit is due Mr. Orchard for the excellent work he has done. The results of his work are convincing testimony of the value of selection.

Another member of the association (Mr. E. A. James, of Rosser) is doing some experimental work with corn which proved to be highly interesting and instructive. Mr. James is working with a view to developing a variety of corn suitable to the climate of Manitoba, and the results promise to be of much value to the west.

#### THE VALUE OF CAREFUL SEED SELECTION IN MAINTAINING THE STANDARD OF OUR CROPS.

(By A. Cooper, *Treesbank, Man.*)

In securing seed for the production of crops there are several important points to be considered by the farmer. In the first place, he must choose those varieties which, to the best of his knowledge, are suited to the climatic and soil conditions of his farm and district. Those of us who live in this part of the great west (southern Manitoba) know by experience that among the cereals there are very few sorts of each which stand out in the front rank as the best yielders of grain of good quality. In the case of wheat we must choose a variety of the highest quality for bread making purposes, so as to maintain the reputation of our wheat in foreign markets. Hitherto, the Red Fife has formed the basis to guide the inspector in grading our commercial product.

The general excellence of Red Fife wheat has been so well established that it justly holds and will continue to hold a place in the front rank of wheat varieties, and for this reason it has been much used as one of the parents in the work of producing new varieties by the process of cross-breeding and new strains through the process of selection.

Wheats possessing all the milling qualities of Red Fife, besides having greater yielding and earlier maturing powers, are being introduced by Dr. Saunders and other cereal experimentalists. Our branch experimental farms carry on the work of propagating the varieties which are found best adapted to the requirements of the farmer, and as these institutions have no ends to serve but those of the Canadian public, it is manifestly to our advantage to make the fullest possible use of them. However, farmers are advised to use caution in growing these hybrids, as past experience has proved the injudiciousness of booming them before their type has become firmly fixed.

The task of producing new varieties is the work of the seed specialist, but the enthusiastic farmer can take up the work thus started for his benefit, and isolate the best types of the sort he chooses to grow by a process of selection, with a view to maintaining purity and productiveness. Variety is said to be the spice of life, and possibly it is the craving for this spice which deters some men from exercising their powers of control over the plant and animal life on their farms. The result of this neglect has been that both crops and live stock are lacking in uniformity.

The next point to be considered is that of purity. This is one of the most difficult things to acquire and maintain in cereal culture, but when a farmer has decided to grow a certain variety of grain, he should see to it that it is pure for commercial and economic reasons, and he should strive to keep it so. The superiority of large, plump seed lies in the greater food supply held in reserve for the young plant, thus giving it a more vigorous start and early growth.

To obtain improvement in our chosen variety, we must follow the same system that is used by the live stock breeder, and use only the best types for purposes of reproduction. It is folly to neglect this fundamental principle, in view of the fact that it has been conclusively demonstrated over and over again by the most carefully conducted experiments that superiority of products, both as to yield and quality, results from the use of strong and vigorous seed of good breeding.

Specialists whose life work it is to study and elucidate the biological problems connected with plant improvement are not entirely unanimous as to the best methods to adopt. Several systems are advocated by different authorities, but for the average farmer, the system employed by the Canadian Seed Growers' Association is looked upon as the most practical and workable, being free from the complications and difficulties which in other systems call for special work by specially trained men. The true function of this association is to create a supply of pure seed by the organized efforts of its members, who are compelled by the constitution and by-laws to observe fixed rules in order to hold their membership and standing. The methods which we follow have been subjected to some adverse criticism from different quarters, but the highest authorities admit that we are doing a good work in improving the standard of our crops. The fact of the active members of this association being obliged to observe certain rules and to work under a rigid system of inspection, and having their work recorded, gives their products a standing in the seed trade which is becoming recognized everywhere as a standard of excellence and reliability, because the ancestry of the seed can be traced through these records from the time when the member commenced his work. My own work as an operating member of this association has not been productive of very striking results, owing to the fact that for the past three seasons the weather has been so persistently unfavourable as to preclude the possibility of much advance being made apart from the purification of the varieties I am growing. Where I live the soil is rather light, and the combined influence of undue heat and drought has seriously interfered with the perfect development of the grain, and consequently, though not by any means discouraged, many of the high hopes I entertained failed to materialize. Most of our members, however, have realized results that cannot be disputed, and the fact that the greatest progress has been accomplished with the best known standard varieties furnishes striking evidence of the suitability of the varieties we already possess and of the necessity of exercising some control over the public craving for something new.

I once heard a famous politician remark that the chief characteristic of the Anglo-Saxon race was their fondness for being humbugged. Confirmation of the truth of this statement is supplied by observing the manner in which farmers show their readiness to pay out high prices for seed grain novelties, many of which are old varieties with new names. I draw attention to this, not in a spirit of antagonism to seed houses, or from motives of selfish hostility to the introduction of tested and trustworthy seeds of any kind, but merely as a warning against the thoughtless expenditure of good money on novelties, except in a small or experimental way.

A very widespread and time-honoured belief exists among grain growers that it is necessary to change seed frequently because of actual deterioration taking place, due to continued culture under the same conditions. The most carefully conducted investigations, however, without a single exception, prove that not only is there no benefit to be derived from the mere change of seed, but that actual loss occurs except when there is a change to a better type of grain, or to a more vigorous grain of the same type. If seed shows signs of degenerating, it simply means, in most cases, that proper care has not been taken in the selection of the seed. When careful attention is given to the selection of the seed, grain will not deteriorate from any change within itself. But to maintain the standard of yield, care must be taken to choose the best for seed and to practise sound methods of rotation, manuring and tillage to keep up the fertility of the soil, thus providing conditions of favourable environment without which returns must be disappointing.



In the case of wheat, it has been the proud boast of the dwellers in the prairie regions of Canada that our king of cereals was the strongest milling wheat in the world, and for that reason commanded the highest price in European markets. This claim has recently been challenged by British millers, who hint that degeneration and deterioration are taking place, the result being a weaker sample from the miller's point of view. I am not going to say that there are any real grounds for this argument. There may be truth enough in it to give it colour, and I can see a good many reasons for complaint, the discussion of which I will not attempt at this juncture. But I would like to emphasize and re-emphasize the absolute necessity of greater attention being paid to the improvement and selection of seed grain, so that on these grounds at least we may not be accused of being parties to any deterioration which may take place.

The continuance of a steady, persistent and systematic plan by which the best seed in this country has so far been produced cannot fail to be permanently profitable, not only to the producer but to the country at large. The man with an aptitude for taking hold of scientific and practical work of this nature has before him a most interesting and remunerative prospect. At present every kind of good seed is in urgent demand to such an extent that profits will eventually accrue to the beginner in the work of seed growing. The extra price per bushel which he is able to realize for his grain is clear profit, further profit being obtained by the increased yield.

The man who is able, enthusiastic and shrewd enough to turn his skill into cash by producing only grain of unusual excellence has a natural right to large returns for his work. By the laws of commerce his reward cannot be denied him. He will usually have the goods that every buyer desires; his recompense will be commensurate with his service to mankind, and top prices will result.

The old agriculture is doomed, and it is the duty of the individual farmer to face his changing conditions and master the problems of the new, in order that he may hold the high place he has surely attained in the national life of this country.

#### POTATO BREEDING IN MANITOBA AND SOME RESULTS OBTAINED.

*(By Harold Orchard, Lintrathen, Man.)*

Vigorous potato seed is all important if one would expect big yields. Small potatoes are likely to be low in vitality while small cuttings are found to be undesirable for seed. Very small potatoes, seed ends and even parings may grow and produce crops, but one should not expect very much from them. In order to obtain maximum yields, it is not only necessary to have choice seed, but one must have selected seed. In order to get this seed, it should be selected in the field at harvesting rather than from the bin.

In 'bin selection' one may take very fine looking tubers, but what does he know of the company they may have had in the hill? Perhaps the rest were too small for market, too rough or perhaps were very few in number.

'Best hill' selection is the only way one can be sure of his seed stock being of first quality. Select from those hills in which all tubers are marketable, of uniform type and shallow eyes. Avoid rough tubers, as the best tend to revert to this soon enough, and hills producing a very large number of tubers should likewise be avoided. These prove very unsatisfactory for seed, and are hard to breed out.

With very careful selection sometimes one will find some stocks improve for a time, then deteriorate. These should be discarded. In the selection of pure seed one must note the top growth and also the blossom.

The best of seed will not give the best results if the land is not properly prepared. Potatoes may grow in fresh ploughed sod or stubble, but it is not in this ground that one expects best results in Manitoba. Properly prepared summer-fallow, back-setting and scrub-breaking invariably give best results where proper attention is

given during the growing season. If taken in time, one should not find much trouble in having a clean potato field and at the same time cultivating the crop at the minimum cost. If one harrows or cultivates the field at intervals of a week to ten days until planting time, a great quantity of weeds will be killed, making after-cultivation much less tedious. When the crop is planted, harrow or use a weeder at once and every week till the plants are about six inches high. By doing this practically all the weeds will be killed. The scuffer should then be put through between the rows every week until the development of tops and roots prevents further cultivation.

Along the above lines of selection and cultivation, the writer has built up strains of potatoes that even in last year's unfavourable season yielded ninety per cent or more of marketable tubers. The writer has also made numerous experiments in different ways of planting, cutting seed and using whole potatoes, and finds that good sized cuttings give the best results and the most even crop. Experiments with seed from various types of hills have also been made, and it has been proven that there is a tendency for tubers to produce hills similar in all respects to the hills from which they came. In one instance last season I planted tubers from hills that had produced only one or two very large even tubers. The results were plain at harvesting—very fine potatoes, but insufficient as regards numbers, which only further goes to prove that 'like begets like' even in potatoes.

#### THE STATUS OF 'FALSE' WILD OATS

(By Norman Criddle, Treesbank, Man.,

I have been asked by your secretary, Mr. Newman, to prepare an introduction to a general discussion on the important question of white, or 'false,' wild oats in relation to the seed grower in particular and to the farmers in general. To begin with, it may be well to mention that these so-called white wild oats are by no means a new discovery in Canada. The late Dr. Fletcher received specimens at least ten years ago, and made numerous experiments which, I believe, led him to the conclusion that they were not true wild oats. Unfortunately the time at his disposal prevented him from concluding the work and much of the data collected was lost through his death.

It has always seemed to me that the reason for the present prominence of false wild oats is not entirely due to their being less numerous formerly, but because we have only recently learned what to look for. A moment's thought will show that false wild oats were hardly known to the average farmer ten years ago.

To begin with, what is a false wild oat? The question has already been answered in part by Dow Brothers and Mr. Cooper in the *Nor'-West Farmer*, as well as by some notes of my own. In brief, a false wild oat is an ordinary oat of any variety with the outward appearance of a wild one. The plant is an exact counterpart of a cultivated oat—Banner or Tartar King type—but can at once be distinguished by the long awns protruding from every spikelet and attached to each individual oat. From wild oats they differ in having stouter stems and usually heavier oats, and also by a more upright growth. Wild oats have always a drooping appearance due to their comparatively longer and more slender pedicle. They also have a more spreading appearance and usually stand above other grain. Unfortunately there seems to be no distinguishing line between the seeds of true wild oats and false, for though sports can usually be recognized by their size and close similarity to the variety from which they originated, yet intermediate forms occur, some of which so closely resemble the wild species that their correct identity can only be guessed at, and, consequently, the growing plant will probably always remain the final arbiter. This, however, applies more to the east where small varieties are often in demand. In the west the larger oats grown should make separation of sports from wild oats comparatively easy. We have also to bear in mind that the statement—very generally taken for granted—that true white wild oats, or albinos as they are often called, revert to black when



grown, has not been proved conclusively, and, indeed, there is some evidence pointing to an opposite conclusion. We should, therefore, be wary under that head until further experiments show what the facts are. The title 'white wild oats' for sports is a misnomer; firstly, because they are not wild oats, and, secondly, because there are black sports also.

The question of how 'false wild oats' have originated is somewhat speculative. Competent botanists claim that constant crossing of species or varieties has a tendency to break up characters, in which case some individuals might reasonably be expected to revert towards their original parents or a species with which their ancestors had been crossed. That these sports retain certain characters and adopt others without exception is due to some form of correlation which it is unnecessary to discuss here. Taking these facts into consideration, we can come to but one conclusion, namely, that false wild oats show undoubted relationship to wild oats, and, therefore, their original progenitors must either have been a species with wild oat character, or wild oat blood has been introduced at some time since.

You have noticed that false wild oats seem to be specially numerous in oats recently introduced. Is this due to crossing with wild oats or to a general breaking up of varieties by too much crossing? The chief question for this meeting to take into consideration is 'How are we to class false wild oats?' They are not wild oats, and, so far as experiments go, do not show the most objectionable features of wild oats, namely, retarded germination or the power to retain their vitality without growing for several years, nor does there seem to be a tendency towards further deterioration. But would it not be wise to carry on other experiments to make sure? It is objectionable on account of its long awns, which will naturally tend to cause shelling when the grain becomes ripe. It is also an impurity, but is it a dangerous one? Can it be classed with wild oats? It seems to me, if I read the evidence aright, that the answer should be 'No,' unless false wild oats reproduce more rapidly than do the common cultivated ones—and the evidence does not show this. There is no reason why they should ever become much more common than they are now. I think the general farmer need have little fear of false wild oats. As to the grain grower, he desires above all things to have absolutely pure seed, and, therefore, it seems to me that a false wild oat is as much an impurity as a black oat would be among white. Can it be classed as a weed in any other sense? I think not, but don't let us be too hasty in arriving at a decision. More experiments are absolutely necessary to come to the final conclusion. It is surely much wiser to keep your prisoner than to give him his liberty hastily on insufficient evidence and find out afterwards that he is guilty.

#### THE STATUS OF THE 'FALSE' WILD OATS.

(By Geo. Dow, Gilbert Plains, Man.)

It gives me great pleasure to be present at this meeting of western members of our association, and especially to have the privilege of supporting a gentleman of Mr. Criddle's ability in a discussion on 'The Status of the False Wild Oat.' I am here in the expectation of learning, rather than of contributing much of value to the discussion.

The question of false wild oats, or perhaps I had better say white wild oats, is one which has particularly interested us for several years in connection with our work as members of the Canadian Seed Growers' Association. It was forcibly brought to our attention by the discovery of a few of these intruders in a lot of Banner oats, grown from registered seed. We had always been very careful in the work of selection and the threshing of the grain from our seed plots, so were at a loss to account for the presence of these sucker-mouthed specimens. At that time, of course, we had no reason for believing them to be other than real wild oats, or at best a hybrid of the wild and cultivated varieties. I may say, though, that before this time we had

noticed a tendency towards increase in the size of the awns on some of our oats. This was regarded as an evidence of increasing strength in the seed, and was so considered by an official of the Seed Branch to whose attention it had been called. It probably has, however, some bearing on the question under discussion.

Determined to keep clear of the wild oats, we decided to take up the hand-picking of our 'Improved Registered' seed, and to chop all feed grain in order to remove all danger of sowing them. The first season after this had been commenced, we were surprised to find a few specimens in our 'General Crop' seed. Very close searching was necessary to discover them, but still they were there. This was very discouraging, and almost caused us to give up the work of selection with oats. We determined, however, to make further efforts, both in the field and by hand-picking the threshed grain, to get rid of these pests.

Matters stood thus when we happened on a specimen which had not been separated from its pin oat. We were surprised to find that this pin oat had no sucker-mouth, and that, therefore, the one point which was regarded as positive proof of the wild oat was missing. An examination of really wild oats showed it to be present in both the main and secondary kernels.

These circumstances taken together caused us to observe more closely specimens we might obtain, and when about this time we undertook the hand-picking of a quantity of another variety of oats, we were specially watchful for any new points. This lot had become mixed with wild ones, both of the real type and the type we now recognize as false. We learned that the false types were of several different colours, and especially that many of them were true to the type and colour of the variety in which they were found. We also found that in more than 65 per cent of the cases where the sucker-mouth was present on the main kernels it was missing from the attached pin oat.

Before this we had noticed that, while the wild black oat was lean and slim, and always more or less hairy, the type we had been studying was always large and plump for the variety; often the largest and plumpest to be found in the sample from which they were taken, the only resemblance to the others being the sucker-mouth and large twisted awns.

We were now forced to accept the conclusion that these were really different from the wild oat, and were in some way produced from the variety in which they were found. This seemed evident as they were clearly of the Banner type when found in our own fields of Banner. Determining to put this to the test, we selected during the winter of 1908 and 1909, from a quantity of threshed oats, a number of kernels having large twisted awns and more or less extended bases. In some the bases were slightly hairy; in others not. These were sowed last spring. The result was interesting, not to say surprising, proving as it did the possibility of the sucker-mouth being produced by individuals which did not themselves possess it. Of the kernels without the sucker-mouth which were sown, 50 per cent produced plants bearing it not only on the main kernels but also on the second, and when the third kernel was present on this as well.

On the other hand, where kernels having the sucker-mouth and the accompanying pin oat without sucker-mouth were planted, both produced it, but on the main kernels only. The second kernels had a more or less extended base, with or without hairs; the third kernels, where present, differed in no way apparently from an ordinary white oat.

This is the sum of our experience with false wild oats. Up to last fall we had no idea that others were having any experience along the same line. It was, therefore, with great interest and pleasure that we read an article from Mr. Criddle, and later one from Mr. Cooper, confirming the view at which we had arrived. As to the place of the false type in the list of weed seeds, although properly to be classed among weeds, we believe that a full knowledge of its real character will show that it should not



be classed as one of the more noxious. If, as seems possible, it comes and goes within the variety in which it is found, its worst feature will be the danger of it being confused with the real wild oat. This danger is regarded by some as sufficiently great to justify the judges at seed fairs in rejecting samples containing them, even though the existence of the false type be admitted. Personally we are of the opinion that the two types can readily be distinguished. As stated before, the false type differs from the parent variety only by the presence of the sucker-mouth and large twisted awn. The sucker-mouth may even be missing, and there is then no certain means of knowing whether or not the false type is present in any particular sample. It would seem impossible to draw the line anywhere other than between the fully fledged false type and the real wild oat. It is possible to obtain a series of awns graduating in size from the merest thread up to the large double and twisted awn of the wild oat. On the same plant, and even in the same head, a great difference in the size of the awns may be found.

PAPERS PRESENTED BY MEMBERS OF THE ASSOCIATION ON THE  
OCCASION OF THE FIRST ANNUAL MEETING OF MEMBERS IN THE  
SASKATCHEWAN DISTRICT, REGINA, SASK., JAN. 25, 1910.

PLANT BREEDING ON THE FARM.

*(By Seager Wheeler, Rosthern, Sask.)*

A few years ago I realized the necessity of sowing only the plumpest and best seed wheat grown on the farm, and it was not long before I saw the good results of this method. In cleaning my seed grain I always use an 8 x 8 or, if necessary, a No. 7 x 7 wire screen at the bottom of my fanning mill.

In cleaning I always put my seed grain through the fanning mill three times, taking out all broken and small grains.

In 1906 I obtained from summer fallow 50 bushels of wheat and from new breaking 48 bushels of wheat per acre, and I am satisfied that these good yields were the result of sowing only pure, clean and plump seed.

In 1905 I secured 5 pounds of Preston wheat from the Indian Head experimental farm, which I sowed on a piece of clean land. From this amount I obtained 30 pounds of good clean wheat. I should have had more than this quantity but for cattle destroying it after I had stacked it. After cleaning I had 20 pounds, which was sown in 1906 on a piece of land that was planted to potatoes the previous season. When threshed this plot yielded 25 bushels. I decided there and then to grow only Preston wheat as it did well for me and was generally about ten days earlier than Red Fife.

Some time in 1907 I received a letter from Mr. Newman, secretary of the Canadian Seed Growers' Association, asking me if I would like to join the association and take up the work of hand selection of seed grain. I gladly consented, and he forwarded me a pamphlet describing the workings of the association.

In the spring of 1908 I selected enough of the plumpest seed I had and sowed it on a special plot of a quarter of an acre. I may say that I generally harrow my fields of grain as much as I possibly can each season when the grain is up 4 to 6 inches high, and this season in getting on the fields with the harrows I had to cross one corner of the seed plot six or eight times till I just about wiped out the corner of the plot. This season we were badly rusted, and a light frost on August 13 did not help any. The seed plot suffered badly, except the corner that I had harrowed so severely, and the only good seed I obtained from the plot was from this corner.

I now had some idea as to how to go to work. I had noticed that this Preston wheat was a mixed variety of red and white chaff. During the winter time I selected 10 pounds of the white chaff and 25 pounds of the red chaff. I decided to select for the white chaff, but saved the 25 pounds of red chaff to sow for comparison.

I now had a good foundation to start on. The result up to this time was that I had secured pure seed, at least free from other varieties and weed seeds.

Last spring I sowed the white chaff separately from the red chaff for comparison on a piece of summer-fallow. The balance of the field was sown with the same wheat containing mixed types of red and white chaff. During the summer I noted the difference; the seed plot was fully 6 to 8 inches higher than the rest of the field, more uniform in stand and height, and with a slightly longer head.

During an absence from home we had a hot, dry spell and gophers cut fully one-third of the plot before I could attend to them.

At threshing time I could not compare yields with the rest of the field, but the balance of the field went 35 bushels per acre. The grain from the seed plot was distinctly noticeable in regard to plumpness and evenness in quality. At the time of cutting we had very high winds which played havoc with the fields of grain, so that we could not make a clean sheaf, but when I cut the seed plot it was a pleasure, as the straw stood up so well that I did not make a single ragged sheaf.

With regard to selecting my heads of wheat for next season's seed plot, I work back and forth from one end of the plot to the other. The wind last season made the work of selecting heads difficult, so that it took me three days altogether to select three good bags full, which I find is sufficient. This amount when threshed should yield 25 to 30 pounds. I secure a little more than I need to allow for cleaning out any light grains, so that when thoroughly cleaned I can have 25 pounds of good plump grain.

I hang the sacks up in a dry, shady place until I can find time later on to thresh them. I keep the heads in the sacks and thresh them out with a stick on a hard floor. When threshed, if there is any wind, I pass it through the air from one pan to another, taking out the chaff and broken heads, then put aside till a slack time when I can sieve out the rest of the broken heads and light grain. I would not trust to cleaning through a fanning mill, as there would be too much waste. For such a small amount of seed I consider it best to pick out any white caps, &c., after putting through the sieves.

With regard to selection of type, I find that at the outside of the plot we find stray stools that have long, open heads, which, at first sight, appear to be very large, but on comparing these with others, in the centre of the plot, they contain no more kernels than the rest. I, therefore, pass these by, selecting heads that contain not less than eight clusters on a side and three or four kernels in a cluster.

I look for a head that is square, close jointed and evenly filled from bottom to top. It is surprising what different types one comes across. I have selected some in which it appears impossible for the clusters to set any closer together. Looking at them sideways, they appear square. This is the type I am selecting; as much as possible a good, solid, even head. Up to the present time I am not able to find all the heads exactly similar, but I fully believe that as each season comes I shall be able to secure enough heads of a certain type, all uniform in regard to size, evenness and type.

With regard to selecting a stiff strawed or rust proof type, I have not been able to do so as yet, but there are possibilities in the future for this work. I am content to go along slowly, building up a good foundation. I am as yet just on the first step of the ladder, but am going to win out to the top if possible.

With regard to treatment for smut, I must say that I have used formalin the last three seasons, and am not troubled with this pest. I did not notice a single smut ball the past season. I always treat my seed, whether clean or not. Prevention is better than cure.



In concluding, I must say that there is a certain fascination in this work. Although it takes up a good deal of our time in the busy time of harvest, I consider we are amply repaid for our labour, and although I am just a beginner, I have secured enough pure seed to sow a plot next season, which I trust will enable me to provide sufficient clean seed for all my needs for a general crop.

NINE YEARS' EXPERIENCE IN SEED SELECTION IN SASKATCHEWAN.

(By F. J. Dash, Hillesden, Sask.)

Some of you are familiar with the methods of the Canadian Seed Growers' Association, but for the benefit of those who are not I will give you a brief outline of the work undertaken by this organization. Our main purpose is to improve the crops of Canada by encouraging the general use of seed improved by selection from varieties of which the product is in demand and has a relatively high market value. The Canadian Seed Growers' Association issues registration certificates for all seed grown in accordance with its rules, and there are three distinct classes of registration. The first is the hand-selected class, which covers only seed obtained from heads selected by hand; the second is the improved class, and only grain obtained from a crop produced from hand-selected seed is eligible for this class; the third is the general crop class, and only seed obtained from a crop produced from improved registered seed is eligible for this class. Seed produced from this general crop registered seed is not eligible for registration, and if any member wishes to commence the work of selection with general crop seed it will be necessary for him to select a sufficient quantity of large heads from plants appearing relatively vigorous and productive to plant at least a quarter of an acre. If any member wishes to commence the work with some good variety which he has already grown and found to be suitable for his own district, it will be necessary for him to make three annual selections before his seed will be eligible for registration.

The way I select the heads for seeding my next year's breeding plot is to wait until the crop is fully matured. Then I go with my two boys and select enough heads from the strongest and most vigorous plants, always watching closely for the correct type of head that I am trying to breed. I select those heads that are growing well inside the borders of the plot and not those that are growing near the sides or those that have any advantage by having more ground to feed from, because it is not likely that any selections made from those plants that have these advantages will reproduce themselves under normal conditions. It takes about a day for three people to select enough heads to fill two bushel baskets well pressed down. I put these heads away carefully where there is no possibility of their getting mixed with other grain. I choose a fine day in the winter and thresh them in a good tight wagon box with two or three sides on. This I find is much better than a floor, because if the box is in good shape there is no danger of getting the selected grain mixed with other grain. Unless a floor is perfectly tight there is quite likely to be some grain in the cracks that will come out with the threshing, but the deep sides on the wagon box will keep the heads from flying all over, which makes it much easier to do the work. I do the threshing with a stick and I always get about twenty pounds of clean seed from this quantity of heads. At seeding time I treat my seed for smut by dipping bag and all into a solution of formalin, and I sow it as soon as it is dry enough to run freely in the seed drill. I usually sow my seed at the rate of one bushel per acre, and I have always had a good stand of crop, but I am thinking of seeding a little heavier in the future, as I find this light seeding encourages too much stooling and it takes longer to mature. I always choose a piece of land for my seed plot that is fenced and near the house so that I can watch it in its different stages of development. At any time that I have a few spare minutes I have not far to go to examine the plot and pull out any plant that should not be there. I have for several years past grown

my hand-selected seed plot either on potato or root land or on fallow, and I have better results from either the potato or root land than I have from the fallow. I find the crop always matures earlier and produces a brighter and stiffer straw, and all the preparation that is necessary after potatoes or roots is to clear off all rubbish and give surface cultivation not more than two inches deep.

I come now to what I consider the most important part of the work, because it is right here that we can easily spoil all our careful work of selection. I refer to the threshing of the grain from the hand selected seed plot. Any farmer that has a threshing machine of his own is in a much better position to do this work properly than is a farmer who has to depend upon other people to do his threshing. I always stack the grain from my hand-selected seed plot inside the fence where it is grown, and when I am ready to thresh it I load it on a rack that has been thoroughly cleaned off and take it to the machine. If the machine has been threshing flax or peas before coming to me, I thresh my seed plot first. Or if I have peas or flax of my own I thresh these first, then follow with the seed plot, as these grains are easily separated from wheat. But if the machine has been threshing wheat before coming to me, I thresh my barley first, then my oats and then my general crop of wheat, which is practically pure, and by this time I consider the machine is in very good shape after cleaning off thoroughly for the seed plot. By arranging my threshing in this way I have been able to keep my seed practically pure. There is one very important feature in this method of seed selection that should not be overlooked, and that is, by selecting the best heads of the particular type we are trying to improve, we eliminate all the undesirable heads. If there is anything in the theory that every plant has one best kernel, then by hand selection as practised by the Canadian Seed Growers' Association we are getting the benefit of this also, or we are getting about as close to it as it is possible for the ordinary farmer to get.

The longer I work at seed selection the more I can learn, and the work comes all the easier. Only three years ago I discovered that I had two distinct types of heads in my breeding plot, one a rather long, thin head, with a very close chaff, which very seldom had more than two kernels in each spikelet full matured. The other was a square-looking head with a more open chaff, and always had three kernels in each spikelet, and in some specimens I have counted four fully matured. Since that time I have been selecting for the latter type only.

There is not much work in this method of hand selection. The one day required for the selection of enough large heads to sow the breeding plot the following year is about all the time taken up during the busy season; the threshing and cleaning can be done in the winter, when time is not very valuable, and there is nothing in connection with this work that cannot be done by any farmer in this province. I am quite satisfied that the increased yield has paid me many times over for the work and time spent. Any extra seed that I have for sale I have always been able to dispose of at a good price and I consider this is clear profit.

#### HOW I DISCOVERED AND PROPAGATED AN EARLY STRAIN OF RED FIFE WHEAT.

*(By Geo. L. Smith, Saskatoon, Sask.)*

In the summer of 1902 I was walking through a crop of Red Fife wheat, which was almost ready for the binder, when I noticed a stool of wheat showing extra fine heads. I plucked three heads, each showing 8 rows of seed, and passed on, admiring my find. When I was advised to preserve this seed and plant it, the proposition looked good enough to be worth the trouble, and the rapid increase from this seed was a great surprise to me. From these heads I took 169 grains which I dibbled in the garden in 1903. As the ground was rich they stooled heavily and the heads came true to the type of those selected. This plot produced 3 pounds of seed.



In 1904 I sowed this seed on a plot of summer fallow very thinly, and secured 260 pounds. As thin showing means extra stooling and consequent delay in development, I was surprised to find this plot was ripe as soon as the crop alongside, and I began to better appreciate this seed since it promised to be an early strain. This was cut down to an even four bushels, which I sowed in a five-acre strip of summer-fallow, the balance of the field being sown at  $1\frac{1}{2}$  bushels per acre. The result was that the selected strain ripened six days ahead of the main crop and threshed 40 bushels per acre, while the main crop gave only 35 bushels. The most striking incident in connection with this test was that the selected wheat was cut before frost, while the main crop lost two grades by frost.

In 1906 I sowed 145 acres of this wheat, and though this crop was not heavy I threshed over 5,000 bushels of wheat, the product of the one grain which produced the three heads selected from my crop in 1902.

In 1906 I was visited by Mr. Newman, secretary of the Canadian Seed Growers' Association, who advised me to more definitely establish this wheat by hand selection, but the gophers destroyed my selected plot in 1907 and no more selection was made until 1908. I shall certainly continue to make hand selections year after year, and develop this strain to the best possible degree of excellence.

So far I have only sought to fix the short, plump type of head, but I think it possible something might be done to get an advantage in earliness by selecting the first developed heads each year.

Looking over my farm notes for 1907, I notice the following: 'Finished wheat cutting September 6; much of the wheat in the district at this date still quite green.'

During the season this wheat was sown thinly I find it ripened in 121 to 125 days from date of sowing, but for the four years—1906-1909—the average was 105 days, and the average yield for the five years—1905 to 1909—23 bushels per acre. I have asked some reliable farmers in other parts of the province to test this wheat along with the common Fife, and I find they get the same results. Mr. Dow, of Ruddell, reports cutting this wheat in 1908 in 107 days, and in 1909 fully a week ahead of the common strain. Mr. D. W. Lasher, of Floral, reports 6 days earlier than Red Fife; ripened with Preston, but a better yield than either common Fife or Preston, and in the wind storms of 1908-09 appears to have suffered less damage from shelling and breaking of straw than either of the others. I noted also last year that my crop shelled less than crops of common Fife alongside.

As to the quality of this grain, I think it at least equal to any other. Last year three-quarters of my wheat graded No. 1 hard. I have exhibited this winter for the first time, and my exhibit at the Saskatoon fair weighed  $65\frac{1}{2}$  pounds per bushel, and scored high enough to promise a good record at the grain show in Regina.

In closing I scarcely need refer to the great advantage that a few days earlier ripening may mean to the crop of the Northwest, especially if this can be gained without loss to the reputation our wheat holds as the best milling wheat in the world.

#### THE COMMERCIAL VALUE OF GOOD SEED.

(By Jno. A. Mooney, Regina, Sask.)

The subject of good seed must be given more thought now than it has ever been given in the past if we are to maintain the high quality of our cereals or get a fair recompense for our labour. The urgent cry of the soil is for the best, and we have the evidence of the past to prove that we shall receive the best if we sow the most perfect seed procurable.

In selecting seed from the threshed grain we should strive to secure mature seed, that is, seed with good large berries which are uniform in size, shape and colour. This can only be found in the purest seed. Also we should not consider suitable for seed any grain that contains noxious weed seeds unless we are prepared to meet the extra

expense of fighting weeds in the future. These weed foes are so tenacious and grasping that we have known of instances where they have driven men off their farms, changed the system of farming in whole districts and lowered the value of the land by one-half.

In looking over what has been accomplished by those who are interested in improving seed, we find that in France the yield of sugar beets has been increased 20 per cent and the sugar content 100 per cent. Professor Hayes, of the United States, by selecting seed wheat got an increased yield of six bushels per acre in the variety that he selected from. Also we find that by selecting for quality the New England states have a much harder wheat than they previously had. The marvellous work done by the Americans in improving corn, both in quality and in yield, has increased the value of that crop in the eyes of the public, and now you will find men paying fabulous prices for even a single cob of corn. The evidence we have would prove conclusively that by selecting our seed from well developed plants in the growing crops and by using this as a foundation of our seed we can increase the yield of our grain from five to ten bushels per acre. When we consider the commercial importance of this, as well as the possibility of improving the quality of our cereals, surely it should appeal to every one interested in agriculture and in the development of our province.

This year the province of Saskatchewan will have 3,000,000 acres of breaking and summer fallow in crop, not to mention stubble. An increase of five bushels per acre by sowing good seed on this land would mean an increased return of 15,000,000 bushels of grain. The value of this at 75 cents per bushel would be \$11,250,000, which amount is offered as a prize to the farmers of Saskatchewan, provided they sow only the best seed and thoroughly cultivate their fields. This divided among the 2,000 school districts of our province would give over \$5,000 to each. Should this not stimulate every farmer to put forth every effort in his power to secure this increase both for himself and his province?



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